

OFFICIAL PUBLICATIONS OF CORNELL UNIVERSITY

VOLUME II

NUMBER 12

COLLEGE OF ARTS AND SCIENCES COURSES OF INSTRUCTION 1911-12

JUNE 15, 1911
PUBLISHED BY CORNELL UNIVERSITY
ITHACA, NEW YORK



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STUDY CARDS

must be filed at the office of the Dean, 143 Goldwin Smith Hall, not later than 5 p.m. on the following days:

- For first term, 1911-12,
sophomores, juniors, and seniors, Saturday, May 20, 1911,
freshmen and other new students, Monday, October 3, 1911.
- For second term, 1911-12,
all students, Wednesday, January 10, 1912.

Underclassmen, candidates for the degree of Bachelor of Arts, in filling out their study cards should conform to paragraph twelve, upperclassmen to paragraph thirteen, of the requirements for that degree, printed on pages i-iii; and freshmen should observe the list of courses open to them as there printed. The original card of each upperclassman must bear the endorsement of his group adviser.

Candidates for the degree of Bachelor of Chemistry in filling out their study cards should conform to the outline of the course as printed on page iv. Before submitting their study cards to the Dean, students should secure the endorsement of the Department of Chemistry.

No student in the College will be recognized by any department as a member of any of its classes until his registration has been made at the Dean's office.

THE COLLEGE OF ARTS AND SCIENCES

Two courses are offered in the College of Arts and Sciences, one leading to the degree of Bachelor of Arts, the other leading to the degree of Bachelor of Chemistry.

REQUIREMENTS FOR THE DEGREE OF BACHELOR OF ARTS

TERMS AND HOURS

1. The requirements for the degree of Bachelor of Arts are residence for eight terms*, and in addition to the prescribed work in the Departments of Physical Culture and Military Science and Tactics, the completion of one hundred and twenty hours of work under the rules governing the choice of studies.

2. In case a student has received surplus entrance credit, there will be deducted from the one hundred and twenty hours required for graduation as many hours as the amount of his surplus entrance credit may warrant, and a student of whom not more than one hundred and eight hours are thus required for graduation will be considered as having completed one term of residence.

3. A student who has satisfied the entrance requirements of this College, and has afterwards completed in two or more summer sessions of Cornell University at least twelve hours of work in courses approved by the departments concerned, may be regarded as having thus satisfied one term of residence. Under no circumstances shall work done in summer sessions be accepted as the equivalent of more than one term. Subject to the same restrictions as apply to courses in the Cornell Summer Session, courses pursued in summer schools elsewhere, by a student regularly registered in this College or in a college of like standing, may be credited towards the degree of Bachelor of Arts, if recommended by the appropriate department of this College, and if the institution where such summer courses were pursued shall certify that those courses, if pursued by a student regularly registered there, would be credited towards the corresponding degree in that college.

4. A student admitted to the College of Arts and Sciences from another college of Cornell University or from any other institution of collegiate rank shall be regarded as having completed the number of terms and of hours to which his records entitle him, and will receive all the privileges of students who have completed the same number of terms and hours by residence in the College. In order, however, to obtain the degree of Bachelor of Arts he must have been in residence at least two terms in the College of Arts and Sciences, and in that College only.

5. A student must register for at least twelve hours each term. A student registering for the first time may register and receive credit for a maximum

*The academic year is divided into two terms.

of eighteen hours for the term. A student whose marks average 85 or more in any term may register and receive credit for a maximum of twenty hours for the following term. A student whose marks average less than 85 in any term may register and receive credit for a maximum of eighteen hours for the following term.

6. A student desiring to elect courses outside the College of Arts and Sciences must first obtain the approval of the Faculty. But any student who, while registered in the College of Arts and Sciences only, is permitted to pursue a course or courses in another college, shall have the number of hours that he may take in any other college under the provisions of paragraph 7 correspondingly reduced, and under no circumstances will he be allowed to take more than thirty hours under the provisions of this paragraph.

7. A student who has satisfied at least six terms of residence, no one of them under the provisions of paragraph 2 or 3, and who has a credit of at least ninety hours, may, with the permission of the faculties concerned, be registered both in the College of Arts and Sciences and also in any other college of Cornell University.

CHOICE OF STUDIES

8. A student registering in the College of Arts and Sciences for the first time must hand in his study-card with list of courses for the term at the Dean's office on or before the third day of instruction.

9. Two weeks before the end of each term a student must hand in his study-card with list of courses for the next term at the Dean's office.

10. A student may make changes in his list of courses only during the first ten days of instruction and with the approval of the Dean.

11. After the first ten days of the term no student shall have the right to withdraw from any course in which he is registered, unless he shall previously obtain the authorization of the Dean to withdraw from the course on the ground of ill-health or for other reason beyond the student's control.

12. Before a student may be registered as a junior he must have completed sixty hours of work which shall include in English and history six hours, in one or more languages other than English six hours, in philosophy and mathematics six hours, and in physics, chemistry, geology, physical geography, and the biologic sciences six hours, of which hours the student is required to take at least twelve, and advised to take more, in his freshman year. Each six hours may be entirely in one division (for example, philosophy six hours), or partly in one and partly in another (for example, philosophy three hours and mathematics three hours). Surplus entrance credit may not be applied in satisfaction of any of these required groups of six hours.

13. Each student shall choose at the beginning of his junior year one of the following groups:

- | | |
|-----------------------------------|--|
| 1. Ancient Languages. | 7. Physics. |
| 2. Modern Languages. | 8. Chemistry. |
| 3. English and Oratory. | 9. Botany. |
| 4. Philosophy and Education. | 10. Zoology and Entomology. |
| 5. History and Political Science. | 11. Physiology, Histology, and Embryology. |
| 6. Mathematics and Astronomy. | 12. Geology and Physical Geography. |

In the group thus chosen he must complete during his junior and senior years at least twenty hours of work. In selecting these twenty hours the student must obtain the advice and approval of some one professor or assistant professor within the group, who shall be chosen by the student himself. But a senior in this college who is registered also in some other college of Cornell University is excused from ten of these twenty hours.

COURSES OPEN TO FRESHMEN WITHOUT SPECIAL PERMISSION OF THE ADMINISTRATIVE BOARD IN CHARGE OF FRESHMEN AND SOPHOMORES

Greek, 1, 3, 5, 6; Latin, 1, 2, 4; Germanic Languages, 1, 1a, 2, 3, 4, 5, 6, 7, 8, 32, 33; Romance Languages, 1, 2, 3, 4, 12, 30, 32, 40, 42, 46; English, 1; Music, 1; History, 1, 21; Bibliography, 1, 1a; Mathematics, 1, 2, 3, 5, 6, 7; Physics, 1, 5, 6, 10; Chemistry, 1, 6, 7; General Biology, 1; Botany, 1, 2; Entomology, etc., 4, 5; Vertebrate Zoology and Neurology, 1, 5; Geology, 1, 2, 11.

THESES

Any senior in the College of Arts and Sciences may arrange with the department in which he is taking his principal work to write a thesis, which, if accepted, shall entitle him to not more than three hours of credit a term, in the discretion of the department. Arrangements regarding a baccalaureate thesis should be made, when possible, at the close of junior year, and may not be made later than the fifteenth day of October in senior year.

VOCATIONAL COURSES

A student preparing to be a teacher should consult the directions given by the School of Education on page 28.

A student intending to follow the five year course leading to the degree of Civil Engineer, of which an outline is given in the Announcement of the college of Civil Engineering, or that leading to the degree of Mechanical Engineer of which an outline is given in the Announcement of Sibley College, should register in his freshman and sophomore years, and may receive credit, for all courses specified in the outline which he elects to follow; but he may not register or receive credit, during those years, for any other courses in mathematics, physics, or chemistry, or any other courses outside the College of Arts and Sciences, than those there specified; nor may he register, during his freshman or sophomore year, for any course in the College of Arts and Sciences which is specified for a later year of the outline which he is following.

Students preparing for other vocations, such as journalism, banking, business, philanthropy, or the various forms of civil service, are advised to plan their studies with the assistance of the professors most intimately concerned.

A student who intends to follow chemistry as a profession should pursue the course leading to the degree of Bachelor of Chemistry.

REQUIREMENTS FOR THE DEGREE OF BACHELOR OF CHEMISTRY

The requirements for the degree of Bachelor of Chemistry are residence for eight terms and the completion of the following courses.

First Year

	No. of Course	First Term	Second Term
Introductory Inorganic Chemistry Chemistry	1	6	—
Qualitative Analysis Chemistry	7	—	6
Analytic Geometry, Differential Calculus, Integral Calculus Mathematics	7	5	5
Introductory Experimental Physics Physics	1	—	4
Drawing Sibley College	D 3	3	—
First Year English English	1	4	4

Second Year

Quantitative Analysis Chemistry	12	6	—
Organic Chemistry Chemistry	30	6	6
Microchemical Methods Chemistry	65	—	2
Gas Analysis Chemistry	19 & 20	3	—
Introductory Physics Physics	6	—	4
Introductory Physical Experiments Physics	10	—	2
Crystallography Geology	12	3	—
Elective		—	3

Third Year

Introductory Physical Chemistry Chemistry	50	3	3
Physical Chemistry Laboratory Chemistry	51	3	3
Spectroscopic Chemical Analysis Chemistry	17	—	2
Quantitative Analysis, Lectures Chemistry	15	—	2
Advanced Quantitative Analysis Chemistry	14	—	4
Physical Experiments Physics	14	3	1
Mechanics Sibley College	M 5	5	—
Mechanical Laboratory Sibley College	X 11	—	3
Elective		3	—

Fourth Year

Electrical Engineering Laboratory . Sibley College	E 13	4	—
Mechanical Laboratory Sibley College	X 20	3	—
Research Chemistry	96(at least)	4	4
Electives at least		5	5

In choosing his elective subjects in the senior year the student is advised to select as his special field some one of the following six divisions of chemistry: inorganic chemistry, analytical chemistry, organic chemistry, physical chemistry, sanitary chemistry, or agricultural chemistry. While the greater part of the elective work should lie in the field thus chosen, the

remainder may comprise courses in any division of chemistry, or such other courses as may be approved by the department of Chemistry.

A student who has satisfied the entrance requirements of the course leading to the degree of Bachelor of Chemistry, and has afterwards completed in two or more summer sessions of Cornell University the equivalent of at least twelve hours of the courses specified in the foregoing outline, may be regarded as having thus satisfied one term of residence. Under no circumstances will work done in summer sessions be accepted as the equivalent of more than one term. Subject to the same restrictions as apply to courses pursued in the Cornell Summer Session, courses taken in summer schools elsewhere, by a student regularly registered in the College of Arts and Sciences of Cornell University or in a college of like standing may, if approved by the Department of Chemistry, be credited toward the degree of Bachelor of Chemistry.

A student admitted from a college of Cornell University or from another institution of collegiate rank to candidacy for the degree of Bachelor of Chemistry will be regarded as having completed the number of terms and the courses to which his records entitle him. But in order to obtain the degree he must have been a candidate and in residence for at least two terms in this College, and in this College only.

A student must register for at least twelve hours each term. No student may without special permission of the Department of Chemistry register for more than nineteen hours in any term.

A student registering in the College of Arts and Sciences for the first time must hand in his study-card with list of courses for the term at the Dean's office on or before the third day of instruction.

Two weeks before the end of each term a student must hand in his study-card with list of courses for the next term at the Dean's office.

A student may make changes in his list of courses only during the first ten days of instruction and with the approval of the Dean.

After the first ten days of the term no student shall have the right to withdraw from any course in which he is registered, unless he shall previously obtain the authorization of the Dean to withdraw from the course on the ground of ill-health or for other reason beyond the student's control.

THE HISTORY OF THE
REIGN OF
HENRY THE SEVENTH
OF ENGLAND
BY
JAMES HALLAM, ESQ.
OF LINCOLN'S INN
IN TWO VOLUMES.
LONDON:
PRINTED BY J. JOHNSON, ST. PAUL'S CHURCH-YARD, 1795.
IN TWO VOLUMES.
VOLUME THE FIRST.
LONDON:
PRINTED BY J. JOHNSON, ST. PAUL'S CHURCH-YARD, 1795.

COURSES OF INSTRUCTION

SEMITIC LANGUAGES AND LITERATURES

1. **Hebrew.** Throughout the year, credit three hours a term. Professor SCHMIDT. M W Th, 2, Goldwin Smith 127.

Grammar (Harper, Gesenius—Kautzsch). Genesis. Ruth and Esther at sight. Exercises in composition. Open only to juniors, seniors, and graduates.

2a. **Arabic.** Throughout the year, credit two hours a term. Professor SCHMIDT.

Grammar (Socin, Wright, Caspari—Müller). Selections from prose writers, poets, and the Qurân. Primarily for graduates.

[2b. **Advanced Arabic.** Throughout the year, credit two hours a term. Prerequisite course 2a. Professor SCHMIDT. T Th, 9, Goldwin Smith 127.

Grammar (Wright—DeGoeje). A group of early suras in the Qurân. Selections from the Prolegomena of Ibn Khaldun.] Not given in 1911-12.

3. **Ethiopic.** Throughout the year, credit two hours a term. Prerequisite courses 1, 2. Professor SCHMIDT. T Th, 3, Goldwin Smith 127.

Grammar (Dillmann—Bezold). Liber Baruch in Dillmann's Chrestomathia Aethiopica, and The Book of Enoch, xxxvii-lxxi (ed. Charles). Study of Ethiopic manuscripts. Open only to students who have had Arabic. Primarily for graduates.

4a. **Assyrian.** Throughout the year, credit two hours a term. Prerequisite courses 1, 2. Professor SCHMIDT.

Grammar (Lyon, Delitzsch). Selections from Meissner's Chrestomatie, Delitzsch's Lesestücke, and Rawlinson's Cuneiform Inscriptions of Western Asia. Open only to graduates.

[4b. **Aramaic.** Throughout the year, credit two hours a term. Professor SCHMIDT. T Th, 4, Goldwin Smith 127.

Grammar (Nestle, Nöldeke, Duval). The Gospel of Matthew in the Sinaitic Syriac, the Curetonian Fragments, the Peshita, and the Evangelium Hierosolymitanum. Inscriptions in the Corpus Inscriptionum Semiticarum, and the Elephantine Papyri.] Not given in 1911-12.

5a. **Egyptian.** Throughout the year, credit two hours a term. Prerequisite courses 1, 2. Professor SCHMIDT. W, 4-6, Goldwin Smith 127.

Grammar (Erman). Hieroglyphic texts. Study of squeezes in the Eisenlohr collection. Primarily for graduates.

[5b. **Coptic.** Throughout the year, credit two hours a term. Prerequisite course 5a. Professor SCHMIDT.

Grammar (Steindorff). Selections from the Gospels and from Pistis Sophia.] Primarily for graduates. Not given in 1911-12.

6. **Semitic Literature.** Throughout the year, credit two hours a term. Professor SCHMIDT. M W, 3, Goldwin Smith 120.

General introduction to the Bible, including Apocrypha and Pseudepigrapha, and special introduction to each book. Designed to give in brief compass the results of scientific inquiry concerning the origin, date, composition, and character of the Jewish and Christian Scriptures. Preparation

of papers, discussion of special topics, and examinations. Open to juniors, seniors, and graduates. No knowledge is required of Semitic languages or of Greek.

7. **Semitic Seminary.** Throughout the year, credit two hours a term. Prerequisite courses 2a, 2b. Professor SCHMIDT. M, 4-6, Goldwin Smith 127.

Study of Arabic inscriptions in Berchem's *Corpus Inscriptionum Arabicarum*, or *Exodus* in the Hebrew text and the ancient versions.

8. **Comparative Semitic Philology.** Throughout the year, credit one hour a term. Prerequisite courses 1, 2, 4b. Professor SCHMIDT. F, 3, Goldwin Smith 127.

Study of certain morphological and syntactical peculiarities of the Aramaic dialects. Interpretation, for purposes of comparison, of texts in Mandæic, Babylonian Talmudic, ancient and modern Syriac, Galilaean, Samaritan and Judæan Aramaic, Palmyrene, and Nabataean. For graduates.

9a. **Oriental History.** Throughout the year, credit two hours a term. Professor SCHMIDT. T Th, 10, Goldwin Smith 127.

Introduction to the history of Asia. Designed, like course 9b, to acquaint the student in a general way with the civilizations of the Orient; sources, methods of study, and present problems; the great epochs, the leading personalities, and the chief institutions. The history of Asia Minor, Syria, Arabia, Irak, Iran, India, China, Japan, Central Asia, and Asiatic Russia will be presented in outline. The illustrative material of the department will be used. Preparation of papers, and frequent examinations. Open to juniors, seniors, and graduates.

[9b. **Oriental History.** Throughout the year, credit two hours a term. Professor SCHMIDT. Introduction to the history of Africa.] Not given in 1911-12

GREEK

1. **Elementary Greek.** The essentials of the grammar; simple exercises in composition; reading of Xenophon's *Anabasis*, books I-IV; selections from the New Testament in Greek. Throughout the year, credit twelve hours for the year. Assistant Professor JONES. Daily, 9, Goldwin Smith 134.

This course is designed for and may be elected by all students that wish to acquire, by extraordinary effort in one year, the ability to read Attic prose. This course is continuous through the year. No credit will be allowed for the first term alone.

3. **Xenophon's Hellenica, Homer's Odyssey.** Throughout the year, credit three hours a term. Prerequisite course 1. Assistant Professor JONES. T Th S, 10, Goldwin Smith 134. May, by permission, be entered in the second term.

5. **Lysias.** First term, credit two hours. Open to those who have taken or are taking course 3, with which it affords an opportunity for freshmen to take five hours of Greek. Assistant Professor JONES. M W, 10, Goldwin Smith 137.

Selected speeches of Lysias illustrative of normal Attic prose and of the simple style in oratory. Collateral lectures on the development of Attic oratory.

6. **Herodotus.** Second term, credit two hours. Open to those who have taken or are taking course 3, with which it affords an opportunity for freshmen to take five hours of Greek. Professor BRISTOL. M W, 10, Goldwin Smith 137. The story of the Persian Wars will be read.

7. **Greek Composition.** Throughout the year, credit one hour a term. Prerequisite course 3 or the equivalent. Assistant Professor JONES. S, 11, Goldwin Smith 137.

This course is based on a systematic and practical study of Greek grammar.

10. **Euripides, the Iphigenia in Tauris and the Medea.** First term, credit three hours. Prerequisite course 3 or the equivalent. Professor STERRETT. M W F, 11, Goldwin Smith 134.

11. **Sophocles, the Oedipus Tyrannus and the Antigone.** Second term, credit three hours. Prerequisite courses 3 and 10 or the equivalent. Professor STERRETT. M W F, 11, Goldwin Smith 134.

15. **Iliad**, selections (about nine books) or DEMOSTHENES, ON THE CROWN. First term, credit two hours. Prerequisite courses 3, 10, 11. Assistant Professor JONES. T Th, 12, Goldwin Smith 134.

16. **Aristophanes** (two comedies). Second term, credit two hours. Prerequisite courses 3, 10, 11. Professor STERRETT. T Th, 12, Goldwin Smith 137. Open to seniors and graduates.

20. **Theocritus, Bion, and Moschus.** First term, credit two hours. Professor STERRETT. T Th, 12, Goldwin Smith 137. Open to seniors and graduates.

21. **Plato, Republic.** Second term, credit two hours. Assistant Professor JONES. T Th, 9, Goldwin Smith 137.

23. **Greek Literature.** Throughout the year, credit one hour a term. Professor STERRETT. T, 12, Goldwin Smith 137.

A history of the development of poetical literature in connection with the political and social history of the people.

26. **New Testament Greek.** Throughout the year, credit two hours a term. T Th, 8, Barnes Hall Library. Dr. WHITE.

First term: introduction to the grammar of the Old Testament; readings from the Synoptic Gospels; second term: readings from the Acts of the Apostles; the Didache and other early Christian writings.

Students should be provided with either Wescott and Hort's, or Nestle's New Testament in Greek.

[33. **Greek Life.** Throughout the year, credit two hours a term. Professor STERRETT.

The land and the people; home life and private antiquities; public life and social institutions. A study of the private life of the Greeks with illustrations by lantern views, photographs, etc., from ancient monuments and remains.] Not given in 1911-12.

35. **Advanced Greek Composition.** Throughout the year, credit one hour a term. Assistant Professor JONES. S, 12, Goldwin Smith 137.

Open to graduates and by special permission to undergraduates. Designed for advanced students who are specializing in the ancient languages and who desire a comparative view of the forms, style, and syntax of classic Greek and Latin prose.

40. **The Comedies of Aristophanes.** Throughout the year, credit two hours a term. Professor STERRETT. W F, 12, Goldwin Smith 137. Special attention is given to the structure of the comedies and to the metrical reading of the choral passages.

A rapid reading course devoted to the study of the entire works of some one author or of a particular field of literature. Exclusively for graduates.

43. **The Agamemnon of Aeschylus.** First term. Professor STERRETT. T Th, 11, Goldwin Smith 137. Textual criticism and literary interpretation. Exclusively for graduates.

44. **Pindar.** The Olympian and Pythian Odes. Second term. Professor STERRETT. T Th, 11, Goldwin Smith 137. The fluent rhythmical reading of the odes is insisted upon. Exclusively for graduates.

46. **The Dialect of Homer.** Throughout the year, credit one hour a term. Professor STERRETT. M, 12, Goldwin Smith 137. For graduates and undergraduates.

50. **Greek Seminary.** Homeric questions from the archaeological point of view. Papers and discussions. Professor STERRETT. W, 2-4. Library, Greek and Latin Seminary Room. Exclusively for graduates.

Pausanias. See GREEK ART AND ANTIQUITIES, course 5.

Modern Greek. See GREEK ART AND ANTIQUITIES, course 7.

Greek Epigraphy. See GREEK ART AND ANTIQUITIES, course 6.

GREEK ART AND ANTIQUITIES

The courses in this department do not require any knowledge of Greek or of Latin and are open to all students except freshmen.

1. **History of Greek Sculpture.** Repeated in second term, credit three hours. Assistant Professor ANDREWS. First term, M W F, 9; second term, M W F, 11, Goldwin Smith Museum.

Lectures in the Museum of Casts. Intended to be supplemented by course 3, but may be taken separately.

3. **Greek Antiquities.** Repeated in second term, credit three hours. Assistant Professor ANDREWS. First term, M W F, 11; second term, M W F, 9, Goldwin Smith 35.

Lectures on pre-Greek art and civilization, Greek architecture, terracottas, coins, bronzes, gems, and vases. Illustrated by the material in the Museum of Casts and by stereopticon views. Intended to be taken with course 1, but may be taken separately.

5. **Pausanias.** Credit two hours. Assistant Professor ANDREWS. Hours to be arranged after consultation, Goldwin Smith 35.

A reading course in the sources of knowledge of Greek topography with special reference to Athens, supplemented by illustrated lectures and by readings from Thucydides and Herodotus.

6. **Greek Epigraphy.** Credit two hours. Assistant Professor ANDREWS. Days and hours to be arranged after consultation, Goldwin Smith 35.

A study of Greek alphabets and inscriptions, chiefly from the large collection of squeezes owned by the department. For graduates and qualified undergraduates.

7. **Modern Greek.** Credit two hours. Assistant Professor ANDREWS. Days and hours to be arranged after consultation. Goldwin Smith 35. The literary language and the colloquial idiom. Athenian newspapers and novels in the vernacular will be read.

LATIN

1. **Livy; Cicero, De Senectute; Horace, Odes and Epodes; Latin Writing.** Throughout the year, credit three hours a term.

Sec. 1, M W F, 10, Goldwin Smith 120. First term, Professor BENNETT; second term, Professor DURHAM.

Sec. 2, M W F, 9, Goldwin Smith 124. Professor ELMER.

Sec. 3, M W F, 12, Goldwin Smith 128. Professor DURHAM.

2. **Sight Translation: Gellius, Selections; Ovid, Metamorphoses.** Oral translation, at sight, from English into Latin. Throughout the year, credit one hour a term.

Sec. 1, T, 11, Goldwin Smith 124. Professor ELMER.

Sec. 2, S, 10, Goldwin Smith 124. Professor ELMER.

Especially recommended as collateral work for those who are taking course 1, but open to all students.

Courses 2 and 3 are given in alternate years.

[3. **Sight Translation: Caesar's Civil War; Phaedrus; Martial.** Throughout the year, credit one hour a term. Professor ELMER.] Not given in 1911-12.

4. **Virgil's Aeneid, Books I-VI.** Second term, credit three hours. Professor ELMER. T Th S, 12, Goldwin Smith 124.

[7. **Latin Conversation and Oral Composition.** Throughout the year, credit one hour a term. Professor DURHAM.] Open to students in the second year of their Latin work. Not given in 1911-12.

8. **Terence, Adelphi; Catullus; Virgil, Georgics; Ovid, Amores; Martial.** Throughout the year, credit three hours a term. Prerequisite course 1. Professor DURHAM. M W F, 9, Goldwin Smith 128.

[9. **Terence, Phormio and Andria; Horace, Satires and Epistles; Tacitus, Agricola and Germania.** Throughout the year, credit three hours a term. Prerequisite course 1. Professor DURHAM.] Not given in 1911-12.

[10. **Sight Translation for Sophomores.** Throughout the year, credit one hour a term. Professor DURHAM.] Open to students in the second year of their Latin work. Not given in 1911-12.

[11. **Selections from Cicero's Letters; Cicero, De Oratore, Book 1.** Throughout the year, credit two hours a term. Prerequisite course 1. Professor ELMER.] Not given in 1911-12.

12. **Selections from the last six books of Virgil's Aeneid; Cicero, De Officiis.** Throughout the year, credit two hours a term. Prerequisite course 1. Professor ELMER. W F, 11, Goldwin Smith 124. Courses 11 and 12 are given in alternate years.

[16. **Selections from the Republican Literature: Plautus, the Captives and Mostellaria; Lucretius; Lectures on the History of Roman Literature.**

Throughout the year, credit three hours a term. Prerequisite course 8, 9, 11, or 12. Professor BENNETT.] Not given in 1911-12. Courses 16 and 17 are given in alternate years.

17. **Literature and History of the Early Empire: Suetonius, Lives of the Caesars; Pliny's Letters; Tacitus' Annals.** Throughout the year, credit three hours a term. Prerequisite course 8, 9, 11, or 12. Professor BENNETT. T Th S, 9, Goldwin Smith 120.

21. **Intermediate Course in Latin Writing.** Throughout the year, credit one hour a term. Prerequisite course 8, 9, 11, or 12. Professor ELMER. M, 2, Goldwin Smith 124.

[26. **Teacher's Training Course.** Throughout the year, credit three hours a term. Open, upon personal application to the professor, to students who have had course 8, 9, 11, or 12, and have taken or are taking course 16 or 17. Professor BENNETT.

Study of the evidences for the pronunciation of Latin; hidden quantities; peculiarities of orthography; theoretical consideration of Latin syntax; lectures on problems connected with the teaching of Latin in secondary schools. Special study of some Latin author read in the schools, with reference to all the points that should be emphasized in elementary instruction.] Not given in 1911-12.

27. **Roman Antiquities.** Throughout the year, credit two hours a term. Open to students of the sophomore, junior, and senior years. Professor BENNETT. W F, 12, Goldwin Smith 120.

First term and until Easter recess: topography and architectural remains of the city of Rome; a systematic consideration of the constitution of the Roman family, status of women, marriage, children, education, slavery, the Roman house and its furniture, food, dress, baths, games and amusements, books, trade, travel, religion, death, burial, etc. Lectures illustrated by lantern views, photographs, and material in the Museum of Casts. Easter recess until end of second term: the political and legal antiquities of the Romans.

[34. **Cicero, in Verrem, Fourth Oration of the Actio Secunda.** Throughout the year, credit one hour a term. Prerequisite course 8, 9, 11, or 12, or the equivalent. Professor ELMER.] Not given in 1911-12.

35. **Virgil, Aeneid VII-XII.** Throughout the year, credit one hour a term. Prerequisite course 8, 10, 11, or 12, or the equivalent. Professor ELMER. Th, 11, Goldwin Smith 124.

This course requires no prepared translation for the class-room work. The professor in charge will himself translate the work with full comments on subject-matter, style, difficulties, etc. The members of the class will endeavor merely to read the original Latin as Cicero himself would have read it. Designed to develop in students the ability to understand and to appreciate the Latin without translating.

41. **Latin Seminary.** Throughout the year. Professor BENNETT. T, 2, and S, 10, Library, Greek and Latin Seminary Room.

The work of the seminary for 1911-12 will consist of the textual and exegetical study of Horace, combined with the reading of all of Horace's works.

The object of the seminary is to familiarize its members with the methods and habits of independent investigation. The work therefore, as far as possible, is thrown into the hands of the students themselves. Exclusively for graduates.

[42. **History, Aim, and Scope of Latin Studies.** Throughout the year. Professor BENNETT.

This course will present the history of Latin study since the Renaissance, will outline the various fields of investigation, stating the present state of knowledge in each, along with the chief problems still awaiting solution, and will give a very full bibliography.] Exclusively for graduates. Not given in 1911-12.

43. **Historical Latin Syntax.** Throughout the year. Professor BENNETT. Lectures on the moods and tenses of the Latin verb, with special reference to the subjunctive,—its primitive meaning and its development in subordinate clauses. Exclusively for graduates.

[44. **Historical Grammar of the Latin Language.** Throughout the year. Professor BENNETT. T Th, 10-11.15, Goldwin Smith 120.

Lectures and exercises on the sounds and inflections of the Latin language from the historical point of view.] Exclusively for graduates. Not given in 1911-12.

45. **Latin Writing, Advanced Course.** Throughout the year. Professor ELMER. M, 2, Goldwin Smith 124. For graduates. Students who have taken course 21 may also be admitted to this course.

46. **History and Development of Roman Epic Poetry.** Throughout the year. Professor ELMER. W, 2, Goldwin Smith 124. Exclusively for graduates.

[47. **Vulgar Latin.** Throughout the year, credit three hours a term. Open to graduates and to qualified undergraduates. Professor DURHAM.

A study of the extension of the Latin language to the Roman provinces, and an investigation of the phonology, the flexions, and the syntax of vulgar Latin. Petronius, *Cena Trimalchionis*; Consentius, *de metaplasmis et barbarismis*; Silviae vel potius Aetheriae peregrinatio ad loca sancta; Diehl, *Vulgärlateinische Inschriften*; Bourciez, *Éléments de Linguistique Romane*. A reading knowledge of French and German is required.] Not given in 1911-12.

48. **Vulgar Latin. Mulomedicina Chironis.** First term, credit two hours. Open to graduates and to qualified undergraduates. Professor DURHAM. Goldwin Smith 128.

[49. **Ennius, Fragments of the Annales.** Second term, credit one hour. Open to graduates and qualified undergraduates. Professor DURHAM.] Not given in 1911-12.

50. **Latin Epigraphy.** Throughout the year, credit three hours a term. T Th, 12, and an additional hour, Goldwin Smith 128. Professor DURHAM. The interpretation of selected inscriptions. Special topics in the administrative history of the Roman Empire will be assigned for investigation. *Carmina Latina Epigraphica* (ed. Bücheler). Open to graduates and qualified undergraduates. A reading knowledge of German and French is required.

Roman History, see ANCIENT HISTORY.

Latin Paleography, see HISTORY, course 43.

GERMAN

1. **Elementary German.** Repeated in second term, credit six hours.
First term.

Sec. 1, daily, 9, Goldwin Smith 183. Assistant Professor POPE.

Sec. 2, daily, 11, Goldwin Smith 177. Mr. ZINNECKER.

Second term.

Sec. 1, daily, 10, Goldwin Smith 177. Mr. ZINNECKER.

Textbooks: Vos's Essentials of German; Hewett's German Reader.

Course 1 is for beginners in German.

1a. **Elementary German.** First term, credit three hours. M W F, 8, Goldwin Smith 177. Dr. ANDREWS.

Thomas's Practical German Grammar (fourth edition); reading of easy German texts.

Course 1a is for those who have received one unit entrance credit in German, and for those who have completed course A in the summer session.

2. **Second German Course.** Repeated in second term, credit five hours.
Prerequisite course 1. Open to those who have presented entrance credit for first-year and second-year German. Cannot be taken by those who have entrance credit for third-year German.

First term.

Sec. 1, M T W Th F, 9, Goldwin Smith 177. Mr. ZINNECKER.

Sec. 2, M T W Th F, 10, Goldwin Smith 177. Dr. ANDREWS.

Sec. 3, M T W Th F, 11, Goldwin Smith 221. Dr. ANDREWS.

Second term.

Sec. 1, M T W Th F, 8, Goldwin Smith 177. Dr. ANDREWS.

Sec. 2, M T W Th F, 9, Goldwin Smith 183. Assistant Professor

BOESCHE.

Sec. 3, M T W Th F, 10, Goldwin Smith 221. Dr. ANDREWS.

Sec. 4, M T W Th F, 11, Goldwin Smith 221. Mr. ZINNECKER.

Textbooks: Thomas's Practical German Grammar; Heyse's Die Blinden; Wildenbruch's Das edle Blut; Storm's In St. Jürgen; Freytag's Die Journalisten. Courses 1 and 2 together are the equivalent of the entrance requirements in German.

3. **Elementary German Composition and Conversation.** Throughout the year, credit three hours a term. Open to those who are taking or have taken course 2.

Sec. 1, W M F, 12, Goldwin Smith, 183. Assistant Professor FLUEGEL.

Sec. 2, M W F, 12, Goldwin Smith 177. Mr. ZINNECKER.

Sec. 3, T Th S, 12, Goldwin Smith 190. Assistant Professor POPE.

Sec. 4, T Th, S, 10, Goldwin Smith 221. Assistant Professor FLUEGEL.

Textbooks: Thomas's Practical German Grammar; Pope's Alternative German Composition. Illustrative maps, charts, and pictures. Exercises conducted in German. It is advisable to combine course 3 with another German course, e. g., 5-6, or 7-8.

4. **Advanced German Composition and Conversation.** Throughout the year, credit three hours a term. Prerequisite courses 1, 2, and two terms of 3, or the equivalent.

Sec. 1, M W F, 10, Goldwin Smith 183. Assistant Professor DAVIDSEN.

Sec. 2, T Th S, 10, Goldwin Smith 183. Assistant Professor DAVIDSEN.

Exercises conducted in German. Theme-writing. This course is essential for the pursuit of advanced work in the department, and must be completed by students that desire to be recommended as teachers of German.

5. **Intermediate German Course.** First term, credit three hours. Prerequisite courses 1 and 2, or the equivalent.

Sec. 1, M W F, 10, Goldwin Smith 190. Assistant Professor BOESCHE.

Sec. 2, M W F, 10, Goldwin Smith 227. Assistant Professor FLUEGEL.

Sec. 3, T Th S, 10, Goldwin Smith 190. Assistant Professor BOESCHE.

German grammar treated topically. Translation, and oral exercises in German on the text. Readings: Keller's *Zwei Novellen* (Die drei gerechten Kammacher, etc.); Freytag's, *Der Rittmeister von Alt-Rosen*.

6. **Intermediate German Course.** Second term, credit three hours. Prerequisite courses 1 and 2, or the equivalent.

Sec. 1, M W F, 10, Goldwin Smith 190. Assistant Professor POPE.

Sec. 2, M W F, 10, Goldwin Smith 227. Assistant Professor FLUEGEL.

Sec. 3, T Th S, 10, Goldwin Smith 190. Assistant Professor BOESCHE.

Continuation of course 5. Texts: Rosegger's *Die Schriften des Waldschulmeisters*; Meyer's *Jürg Jenatsch*.

7. **Reading Course.** First term, credit two hours. Prerequisite courses 1-3, 5, and 6, or the equivalent. Assistant Professor FLUEGEL. T Th, 11, Goldwin Smith 183. Interpretation of difficult literary prose. Biedermann's *Deutsche Bildungszustände des achtzehnten Jahrhunderts*; Tombo's *Deutsche Reden*.

8. **Rapid Reading Course.** Second term, credit two hours. Prerequisite courses 1-3, 5, and 6, or the equivalent. Assistant Professor FLUEGEL. T Th, 11, Goldwin Smith 183.

A large number of texts of ordinary difficulty selected from the works of modern German authors will be read and discussed in German.

9. **Schiller's Life and Early Dramas.** Lectures in German on Schiller's life, class and collateral readings; *Die Räuber*; *Kabale und Liebe*; *Don Karlos*; selections from *Wallenstein*. First term, credit three hours. Prerequisite courses 1-3, 5, and 6, or the equivalent. Assistant Professor FLUEGEL. M W F, 11, Goldwin Smith 183.

[10. **Schiller, Wallenstein** (three parts). First term, credit three hours. Prerequisite courses 1-3, 5 and 6, or the equivalent.

Additional readings: *Geschichte des dreissigjährigen Krieges*. [Historical and philosophical essays.] Not given in 1911-12.

11. **Goethe; his life and work.** First term, credit three hours. Prerequisite courses 1-6, or the equivalent. Professor FAUST, M W F, 9, Goldwin Smith 190.

Readings: Goethe's poems; *Götz von Berlichingen*; Tasso; *Iphigenie*.

12. **Goethe's Faust**, part I and selected portions of part II. Second term, credit three hours. Prerequisite courses 1-6, or the equivalent. Professor FAUST. M W F, 9, Goldwin Smith 190.

A survey of the genesis and development of the drama, an examination of its historical and legendary elements, and a study of its criticism of life.

13. History of German Literature. First term, credit three hours. Prerequisite courses 1-3, 5 and 6, or the equivalent. Professor FAUST. T Th S, 9, Goldwin Smith 190.

An outline lecture course beginning with the Old High German period and extending through the seventeenth century. Lectures, recitations, and collateral readings.

14. History of German Literature. Second term, credit three hours. Prerequisite courses 1-3, 5, and 6, or the equivalent. Professor FAUST. T Th S, 9, Goldwin Smith 190.

An outline lecture course beginning with the eighteenth century and extending to the present time. Lectures, recitations, and collateral readings.

15. The German Drama of the Nineteenth Century. First term, credit three hours. Prerequisite courses 1-6, or the equivalent. Assistant Professor DAVIDSEN. M W F, 11, Goldwin Smith 190.

From Kleist to Hebbel. Lectures in German and collateral readings.

16. The German Drama of the Nineteenth Century. Second term, credit three hours. Prerequisite courses 1-6, or the equivalent. Assistant Professor DAVIDSEN. M W F, 11, Goldwin Smith 190.

From Hebbel to the present time. Lectures in German, and collateral readings. Continuation of course 15.

[17. The Literature of the Reformation. First term, credit three hours. Prerequisite courses 1-6, or the equivalent.

Lectures in German, illustrative readings from the works of Martin Luther, Ulrich von Hutten, Hans Sachs, Thomas Murner, and Johann Fischart; also from the Volksbücher and folk-songs of the sixteenth century.] Not given in 1911-12.

[18. Lessing, His Life, Works, and Period. Second term, credit three hours. Prerequisite courses 1-6, or the equivalent.]

Lectures in German and collateral readings from Lessing's dramas and prose writings.] Not given in 1911-12.

[19. The Romantic Movement in Germany. First term, credit three hours. Prerequisite courses 1-6, or the equivalent. Assistant Professor BOESCHE.

The underlying principles of the Romantic movement, its expression in literature, and influence on the national life and ideals.

Readings from Novalis, Tieck, Arnim and Brentano (Des Knaben Wunderhorn), Uhland, Chamisso, Eichendorff, with introductory and connecting lectures.] Not given in 1911-12.

20. Sturm und Drang. Second term, credit three hours. Prerequisite courses 1-6, or the equivalent. Assistant Professor BOESCHE. M W F, 10, Goldwin Smith 181.

Lectures and readings illustrating the character of the Storm and Stress movement in Germany and its significance in the history of German literature. Attention will also be given to the English and French influences upon the origin of Storm and Stress.

Textbook: Stürmer und Dränger, vol. I-III, ed. by A. Sauer, in Kürschner's Deutsche National-Literatur.

[21. **Friedrich Hebbel**]; his dramatic works and theory of the drama. First term, credit two hours. Prerequisite courses 1-6, and at least six hours advanced work in German literature. Assistant Professor DAVIDSEN.] Not given in 1911-12.

[22. **Henrik Ibsen**. Second term, credit two hours. Prerequisite courses 1-6, and at least six hours advanced work in German literature. Assistant Professor DAVIDSEN.

A study of Ibsen's representative dramas (in the German translation), and of his influence on modern German literature.] Not given in 1911-12.

23. **Richard Wagner, His Life and Works**. Second term, credit three hours. Prerequisite courses 1-2. Assistant Professor POPE. T Th S, 10, Goldwin Smith 128.

A lecture course in English on Wagner's theory of the music drama, the sources of his operas, his place in German literature, and his influence on modern culture. The texts of the principal operas will be read in class and biweekly illustrative recitals will be given throughout the term.

[24. **Lyric and Ballad Poetry**. Second term, credit three hours. Prerequisite courses 1-3, and 5. Assistant Professor POPE.

The development of German lyric poetry from the Middle High German period to the present. Especial attention given to a literary appreciation of modern lyrics and ballads.] Not given in 1911-12.

25. **Studies in the Technique and Style of Nineteenth Century Prose Writers**. First term, credit two hours. Prerequisite courses 1-6, and at least six hours advanced work in German literature. Assistant Professor DAVIDSEN. T Th, 11, Goldwin Smith 190.

26. **Studies in the Technique and Style of Nineteenth Century Prose Writers**. Second term, credit two hours. Prerequisite courses 1-6, and at least six hours advanced work in German literature. Assistant Professor DAVIDSEN. T Th, 11, Goldwin Smith 190.

Continuation of course 25.

27. **Lectures in German on Epochs of German History**. First term, credit one hour. Assistant Professor BOESCHE. M, 12, Goldwin Smith 190.

Illustrated by lantern slides.

The purpose of the course is to present in vivid historical pictures the period of migration, the Middle Ages, the Reformation, the Thirty Years' War, the wars of Frederick the Great, the age of Napoleon, and of Bismarck, and therewith to impress the relations between German history and literature.

28. **Lectures in German on Germany and German Institutions**. Second term, credit one hour. Assistant Professor DAVIDSEN. S, 11, Goldwin Smith 190.

The country and its population; the constitution of the Empire; the army and the navy; schools and universities.

[29. **Lectures in German on German Art**. Second term, credit one hour. Assistant Professor DAVIDSEN.

German churches and castles; Dürer and Holbein; German painters of the nineteenth century. The lectures will be illustrated by lantern views.] Not given in 1911-12.

30. **The History of the German Element in the United States.** First term, credit one hour. Professor FAUST. W, 12, Goldwin Smith 190.

The characteristics of the German immigrations of the seventeenth, eighteenth, and nineteenth centuries; their arrival, location, and activities. The relative importance of the German as a formative element in the building of the nation, with special reference to political, social, and educational influences.

31. **German Folklore.** Second term, credit one hour. Assistant Professor FLUEGEL. W, 11, Goldwin Smith 183.

Lectures in German, in part illustrated, on ancient German superstitions, legends, customs and traditions. Collateral readings in E. H. Meyer's *Deutsche Volkskunde*.

32. **Scientific German.** Second term, credit two hours. Prerequisite courses 1 and 2, or three years of German in high school. Assistant Professor FLUEGEL. M F, 11, Goldwin Smith 183.

Texts: Lassar-Cohn, *Die Chemie im täglichen Leben*, followed by the reading of scientific and technological monographs selected to meet the needs of the class.

33. **Elementary Phonetics and its Application to the Study of Modern Languages.** First term, credit one hour. Assistant Professor DAVIDSEN. S, 11, Goldwin Smith 190.

[34. **Principles of Word-Formation.** First term, credit one hour. Assistant Professor DAVIDSEN.

Composition and derivation of words and similar phenomena. A course supplementing the study of German grammar and affording a deeper insight into the structure of the German language.] Not given in 1911-12.

35. **Topics in Historical German Syntax.** Second term, credit three hours. Assistant Professor BOESCHE. M W F, 11, Goldwin Smith 177.

An examination and explanation of difficult or peculiar modern German constructions in the light of the past stages of the language and of analogous developments in other languages. Lectures and reports on assigned works of reference. This course is especially adapted to the needs of teachers.

36. **Elementary Middle High German.** First term, credit three hours. Prerequisite courses 1-6, and at least six hours advanced work in literature. Assistant Professor POPE. M W F, 10, Library, German Seminary.

Grammar; reading of the popular epics, *Nibelungenlied* and *Kudrun*; German prose of the twelfth and thirteenth centuries. Paul's *Mittelhochdeutsche Grammatik*; Bachmann's *Mittelhochdeutsches Lesebuch*.

[37. **Modern Scandinavian.** First term, credit three hours. Dr. ANDREWS. A brief study of the principles of Swedish grammar, followed by readings from standard Swedish authors.] Not given in 1911-12.

[38. **Modern Scandinavian.** Second term, credit three hours. Dr. ANDREWS.

Readings from standard Norwegian authors with a brief outline of the history of the Dano-Norwegian language and literature.] Not given in 1911-12.

39. **Teachers Course.** Second term, credit two hours. Prerequisite courses 1-6, and twelve hours advanced work in German literature or phil-

ology. Professor FAUST, assisted by other members of the German department. F, 2-4, Goldwin Smith 181.

Methods of teaching modern languages; examination and criticism of textbooks available for the study of German; requirements for teachers' examinations, etc.

40. **Advanced Middle High German.** Second term, credit three hours. Prerequisite course 36. Assistant Professor POPE. M W F, 12, Goldwin Smith 177.

Detailed study of Middle High German grammar. Special study of • Wolfram's Parzival. Primarily for graduates.

41. **Gothic.** First term, credit three hours. Assistant Professor BOESCHE. M W F, 11, Goldwin Smith 182.

Streitberg's *Gotisches Elementarbuch*; *Die Gotische Bibel*, hrg. von Streitberg. This course will serve as a general introduction to Germanic philology. Primarily for graduates.

[42. **Old High German.** First term, credit three hours. Prerequisite course 36. Assistant Professor POPE. Primarily for graduates.] Not given in 1911-12.

43. **Old Icelandic.** First term, credit three hours. Dr. ANDREWS. T Th S, 12, Library, German Seminary.

A study of the elements of Old Norse grammar and the relation of Old Norse to the other Germanic dialects. Reading of saga-texts: *Hoensna-Thoris-saga*, and *Bandamanna-saga*. Primarily for graduates.

44. **Old Icelandic.** Second term, credit three hours. Dr. ANDREWS. T Th S, 12, Library, German Seminary.

Reading of some group of Eddic poems with an introduction to their critical study. The poems treating the Sigurd legend will be studied in connection with the *Volsunga-saga*, and other sources.

45. **Principles of Germanic Philology.** Second term, credit one hour. Prerequisite course 41. Dr. ANDREWS. W, 3, Goldwin Smith 178.

A discussion of the fundamental principles of linguistic relationships within the old Germanic dialects. Lectures and illustrative problems.

46. **German Seminary.** First term, credit two hours. Professor FAUST. F, 2-4, Goldwin Smith 181.

Goethe's *Faust*, Part II. Reports and independent investigation by members of the seminary.

47. **German Seminary.** Second term, credit two hours. Professor FAUST. T, 2-4, Goldwin Smith 181.

German American literature, including a study of the Pennsylvania-German dialect, travel-literature, books on America. Reports and independent investigation by members of the seminary.

48. **Philological Seminary.** First term, credit two hours. Assistant Professor POPE. T, 2-4, Goldwin Smith 182.

Discussion of special topics in the field of Germanic philology. Subject or 1911-12: Old Saxon literary monuments.

The Deutscher Verein, a club consisting of faculty members and students interested in the study of German literature and institutions meets twice a month for social intercourse, lectures and discussions and practice in speaking German.

ROMANCE LANGUAGES

Students intending to teach French should take the following courses as a minimum requirement for their purpose: 3, 4, 8, 12, 13, 14, 23, and at least two other courses in French literature.

1. First Year French. Repeated in second term, credit six hours.

First term.

Sec. 1, daily, 12, Goldwin Smith 281. Dr. MASON.

Sec. 2, daily, 8, Goldwin Smith 283. Assistant Professor GORDON.

Sec. 3, daily, 9, Goldwin Smith 277. Dr. PUMPELLY.

Second term.

Sec. 1, daily, 12, Goldwin Smith 290. Dr. MASON.

A course for beginners, with special reference to composition.

2. Second Year French. Repeated in second term, credit five hours.

Prerequisite course 1, or the equivalent.

First term.

Sec. 1, M T W Th F, 9, Goldwin Smith 281. Dr. MASON.

Sec. 2, M T W Th F, 10, Goldwin Smith 281. Mr. DALE.

Sec. 3, M T W Th F, 12, Goldwin Smith 290. Dr. PUMPELLY.

Second term.

Sec. 1, M T W Th F, 9, Goldwin Smith 277. Mr. DALE.

Sec. 2, M T W Th F, 10, Goldwin Smith 290. Dr. PUMPELLY.

Sec. 3, M T W Th F, 12, Goldwin Smith 281. Mr. DALE.

Composition and reading of modern texts.

3. Third Year French. Repeated in second term, credit three hours.

First term.

Sec. 1, M W F, 11, Goldwin Smith 290. Professor COMFORT.

Sec. 2, T Th S, 11, Goldwin Smith 281. Dr. MASON.

Sec. 3, T Th S, 12, Goldwin Smith 277. Assistant Professor HAMILTON.

Second term.

Sec. 1, T Th S, 9, Goldwin Smith 281. Dr. MASON.

Sec. 2, M W F, 10, Goldwin Smith 277. Assistant Professor HAMILTON.

Designed primarily for freshmen who have passed the advanced entrance examination. It is prerequisite for all the following courses in French, except 12 which may be profitably taken in connection with it. Emphasis is laid upon the accurate translation in class of difficult texts, with the necessary grammatical explanations.

4. History of French Literature. Repeated in second term, credit three hours. Prerequisite course 3.

First term.

Sec. 1, M W F, 10, Goldwin Smith 290. Professor COMFORT.

Second term.

Sec. 1, M W F, 11, Goldwin Smith 290. Professor COMFORT.

Sec. 2, T Th S, 9, Goldwin Smith 290. Assistant Professor GUERLAC.

Lectures on French literature since the Middle Ages, with outside reading and reports. Section 1 is conducted in English; section 2, in French. Prerequisite for all the following courses in French literature, but not for courses 12 and 14.

5. **French Literature of the Seventeenth Century.** Throughout the year, credit three hours a term. Prerequisite course 4. Professor COMFORT. M W F, 9, Goldwin Smith 290.

Lectures on the literary and social movements of the seventeenth century. Parallel reading of classic texts. The first term is devoted chiefly to a study of the dramatists; the second term to the prose writers.

6. **French Literature of the Eighteenth Century.** Throughout the year, credit three hours a term. Prerequisite course 4. Assistant Professor GUERLAC. M W F, 10, Goldwin Smith 277.

Lectures, outside reading, and reports.

7. **French Literature of the Nineteenth Century.** Throughout the year, credit three hours a term. Prerequisite course 4. Dr. MASON. T Th S, 10, Goldwin Smith 278.

The main currents of French literature since Chateaubriand and Mme. de Staël are treated in lectures. Outside reading and reports.

8. **French Dramatic Literature.** Throughout the year, credit three hours a term. Prerequisite course 4. Professor OLMSTED. M W F, 11, Goldwin Smith 283.

Study of the French drama since 1552. The classical period will be studied during the first term, and the drama since 1830 during the second term.

[9. **The Novel in France.** Throughout the year, credit three hours a term, prerequisite course 4. Professor OLMSTED.

Study of the Novel in France since 1610.] Not given in 1911-12.

12. **Elementary French Conversation and Composition.** Throughout the year, credit three hours a term. Prerequisite course 2 or the equivalent.

Sec. 1, M W F, 11, Goldwin Smith 277. Dr. PUMPELLY.

Sec. 2, T Th S, 10, Goldwin Smith 277. Assistant Professor GUERLAC.

This course should be taken early by all students who are specializing in French, if possible in connection with course 3.

13. **History of France from the Roman Conquest to 1910.** First term, credit three hours. Prerequisite course 3. Assistant Professor GUERLAC. T Th S, 11, Goldwin Smith 283.

Intended for those who desire some knowledge of French history and civilization as a basis for the study of French literature. A reading knowledge of French is required. Lectures and reports.

14. **Advanced French Conversation and Composition.** Throughout the year, credit three hours a term. Prerequisite courses 3 and 12. Assistant Professor GUERLAC. M W F, 12, Goldwin Smith.

Admission to this course depends upon the grade of work done in course 12, and, before registration, permission must be obtained from the Professor in charge.

18. **French Lyric Poetry.** Throughout the year, credit one hour a term. Prerequisite course 4. Professor OLMSTED. T, 10, Goldwin Smith 283.

Study of the general development of lyric poetry in France since the fifteenth century.

22. **French Literature of the Sixteenth Century.** First term, credit three hours. Prerequisite course 4. Assistant Professor GORDON. M W F, 11, Goldwin Smith 281.

Readings from Montaigne, Rabelais, Calvin, and the poets of the *Pléiade*. Lectures on the literature of the Renaissance in France.

23. **French Philology.** Second term, credit three hours. Prerequisite course 4 and entrance Latin. Assistant Professor GORDON. T Th S, 11, Goldwin Smith 281.

This course should be taken in the junior or senior year by all students who expect to teach French, and must be taken during the first year of graduate study, if not before, by all candidates for the Master's degree who present French as their major subject.

24. **French Medieval Literature.** Second term, credit two hours. Prerequisite course 4. Professor COMFORT. T Th, 9, Goldwin Smith 290.

Lectures upon the literary genres developed during the Middle Ages in France: epic, romantic, lyric, and satiric poetry; the drama, history, etc. Outside reading and reports. A knowledge of old French is not required.

25. **Comparative Romance Philology.** First term, credit two hours. Assistant Professor HAMILTON. Hours to be arranged.

This course should be taken in the first year of graduate study. A reading knowledge of Latin, French, German, and either Spanish or Italian is required.

26. **Teachers Course.** First term, credit two hours. W, 2:30, Goldwin Smith 277.

Intended for those who are going to teach French. This course will be conducted by the staff of the department. Should be taken in the senior year.

28. **Old French Texts.** Throughout the year, credit two hours a term. Prerequisite course 23, Latin, and German. Professor COMFORT. T, 2:30. Library, French Seminary.

A linguistic and literary study of selected old French texts. In 1911-12, the texts studied will be *la vie de S. Alexis* (ed. G. Paris) and *Erec et Enide* and *Cligés* of Chrétien de Troyes (ed. Förster). Primarily for graduates.

30. **First Year Italian.** Throughout the year, credit three hours a term. Assistant Professor HAMILTON. M W F, 9, Goldwin Smith 283.

Pronunciation, grammar, composition, and reading. This course may not be taken in the same year with course 40.

32. **Second Year Italian.** Throughout the year, credit three hours a term. Prerequisite course 30. Assistant Professor HAMILTON. T Th S, 9, Goldwin Smith 283.

Reading and composition. Lectures on nineteenth century prose and poetry. Outside reading.

[33. **Petrarch and Modern Poetry.** Throughout the year, credit two hours a term. Prerequisite course 32. Assistant Professor HAMILTON.

Lectures on Petrarch. Readings from Petrarch, Lorenzo il Magnifico, Poliziano, Sannazaro, Pontano, Bembo, Vittoria Colonna, Michael Angelo, and the court poets of the Renaissance.] Not given in 1911-12.

34. **Boccaccio and Modern Prose.** Throughout the year, credit two hours a term. Prerequisite course 32. Assistant Professor HAMILTON. Hours to be arranged.

35. **Dante and the Middle Ages.** Throughout the year, credit two hours a term. Prerequisite course 32. Assistant Professor HAMILTON.] Not given in 1911-12.

36. **Old Italian.** Second term, credit two hours. Assistant Professor HAMILTON. Hours to be arranged.

Lectures on the history of the Italian language and the development of the literary tongue. Outline of the dialect phonology and morphology. Readings from old Italian texts. Primarily for graduates.

40. **First Year Spanish.** Throughout the year, credit three hours a term.

Sec. 1, M W F, 10, Goldwin Smith 283. Professor OLMSTED.

Sec. 2, M W F, 12, Goldwin Smith 283. Assistant Professor GORDON.

Sec. 3, T Th S, 8, Goldwin Smith 281. Mr. DALE.

Grammar, composition, and reading. This course may not be taken in the same year with course 30.

42. **Second Year Spanish.** Throughout the year, credit three hours a term. Prerequisite course 40 or the equivalent. Assistant Professor GORDON. T Th S, 12, Goldwin Smith 283.

Rapid reading in class of modern Spanish authors: Alarcón, Galdós, Valdés, and Echegaray.

[44. **Spanish Dramatic Literature.** Throughout the year, credit two hours a term. Prerequisite course 42 or the equivalent. Professor OLMSTED.] Not given in 1911-12.

46. **The Spanish Novel.** Throughout the year, credit two hours a term. Prerequisite course 42 or the equivalent. Professor OLMSTED. T Th, 11, Goldwin Smith 278.

Study of the Spanish novel since 1553. First term: the Rogue novels (beginning with *Lazarillo de Tormes*), Cervantes' *Don Quijote* and *Novelas Ejemplares*, etc. Second term: the Spanish novel since the beginning of the nineteenth century.

[47. **Old Spanish.** Throughout the year, credit two hours a term. Prerequisite course 46. Professor OLMSTED. Hours to be arranged.

A study of old Spanish grammar and reading of early texts. Primarily for graduates.] Not given in 1911-12.

50. **Portuguese Grammar and Reading.** Throughout the year. Hours to be arranged. Prerequisite course 40. Professor OLMSTED. Primarily for graduates.

[60. **Old Provençal.** Second term, credit two hours. Assistant Professor HAMILTON.

Lectures on the literature of Provence; Provençal influence upon Italian literature in the thirteenth century; the linguistic relations of Provence and the Catalan districts. Readings from old texts. Primarily for graduates.] Not given in 1911-12.

ENGLISH

1. **Introductory Course.** Throughout the year, credit four hours a term. Students who have not taken the course in the first term may enter in the second term. Open only to underclassmen who have satisfied the entrance requirement in English. Professor STRUNK, Assistant Professors NORTHUP, COOPER, and ADAMS, Drs. MONROE, BAILEY, and BROUGHTON, and Messrs. KIRK, PRALL, and CARROLL. Seventeen sections, at the following hours: M F S, 8, 9, 11, 12; M T Th F, 10, 11, 12; T W Th F, 10, 11. Rooms to be announced.

A study of representative works in English literature, including three plays of Shakespeare, five modern novels, and selected lyrics and essays. Practice in composition in connection with the reading, with incidental study of the principles of writing. The course is in charge of Professor STRUNK.

Students who elect English 1 must apply at Goldwin Smith 159 on Tuesday, Wednesday, or Thursday of registration week for assignment to sections.

2. **Nineteenth Century Prose.** Throughout the year, credit three hours a term. Prerequisite course 1.

Sec. 1, T Th S, 12, Goldwin Smith 164. Assistant Professor NORTHUP.

Sec. 2, M W F, 9, Goldwin Smith 162. Mr. KIRK.

Sec. 3, M W F, 12, Goldwin Smith 162. Dr. PEEK.

Reading of English prose with especial reference to style; practice in composition, with conferences.

3. **English Poetry.** Throughout the year, credit four hours a term. Students who have not taken the course in the first term may enter in the second term. Open only to freshmen who are not taking English 1. Lectures, T Th, 10. Professor SAMPSON. Recitations, M W, 9, 10, 11, 12; F S, 8, 9, 10, 11. Dr. PEEK and Mr. SMITH. Rooms to be announced.

A study of Tennyson, Browning, Wordsworth, Milton, and Shakespeare.

5. **Advanced Composition.** Throughout the year, credit three hours a term. Open to upperclassmen who satisfy the instructor of their proficiency in composition. Mr. SMITH. M W F, 10, Goldwin Smith 163.

Essays, short stories, and other exercises. Intended especially for students who look forward to writing as a profession.

6a. **Argumentative Composition.** First term, credit three hours. Prerequisite course 1. Dr. MONROE. T Th S, 11, Goldwin Smith 164.

A study of the principles of argumentative writing, with practice in composition.

9b. **Teachers Course.** Second term, credit one hour. Dr. BAILEY. Hour and room to be announced.

Lectures and conferences on the teaching of English in the secondary schools. Open to seniors and graduates who intend to teach English.

10. **Play-Writing.** Throughout the year, credit two hours a term. Professor SAMPSON. T Th, 11.

Open to upperclassmen who have distinguished themselves in composition, or who show some special aptitude for the proposed work.

11. **Old English.** Throughout the year, credit three hours a term. Prerequisite course 1. Dr. MONROE. M W F, 11, Goldwin Smith 164.

Reading of selections from the Old English Chronicle, King Alfred, Ælfric, and other representative prose texts, and of the simpler poetry. Some attention is given to one or two important Middle English texts. Supplementary lectures on the growth of the language.

No student will be recommended for a high school teachership in English unless he has had this course or its equivalent.

12. **Middle English.** Throughout the year, credit two hours a term. Prerequisite course 11. Professor STRUNK. T Th, 9, Goldwin Smith 160.

A study of the language and of representative authors from the twelfth to the fifteenth centuries, including Chaucer.

[18a. **Linguistics.** First term. Dr. MONROE.

A survey of the principles of the life and growth of language. An elementary course of lectures and assigned reading, the illustrative material being chosen mainly from English as a living speech.] Not given in 1911-12.

22. **Nineteenth Century Poetry.** Throughout the year, credit three hours a term. Students who have not taken the course in the first term may enter in the second term. Open to sophomores and upperclassmen.

Sec. 1, M W F, 11, Goldwin Smith 156. Professor SAMPSON.

Sec. 2, T Th S, 9, Goldwin Smith 162. Assistant Professor COOPER.

Sec. 3, T Th S, 10, Goldwin Smith 156. Professor STRUNK.

Wordsworth, Coleridge, Byron, Shelley, and Keats, and assigned readings in prose.

24. **English Translations of Greek and Latin Classics.** Throughout the year, credit three hours a term. Open to upperclassmen. Assistant Professor COOPER. T, 3, Th, 3-5, Goldwin Smith 163.

Rapid reading in the best accessible translations, with emphasis upon Greek masterpieces; for example, the Iliad and the Odyssey, selected plays of Sophocles, and selected dialogues of Plato. Translations from the Latin will be chosen for the bearing of the originals on modern literature.

25b. **Old English Readings.** Second term, credit two hours. Prerequisite, first term of 11. Dr. MONROE. M W, 3, or hours to be arranged, Goldwin Smith 164.

Reading of selected Old English works, including portions of Beowulf.

31a. **Spenser.** First term, credit three hours. Prerequisite course 2 or

22. Dr. BAILEY. T Th S, 9. Goldwin Smith, room to be announced.

A study of the poetry of Spenser, with reference to the literature of his time.

31b. **Milton.** Second term, credit three hours. Prerequisite course 2 or 22. Dr. BAILEY. T Th S, 9, Goldwin Smith, room to be announced.

A study of the poetry and the prose of Milton, with reference to the literature of his time.

[32. **English and Scottish Ballads.** Throughout the year, credit three hours a term. Open to upperclassmen.

A study of the ballad as a form of literature; the theories of its origin and development; its relations to other forms of early narrative poetry and to the modern literary ballad; comparison with kindred ballads of other nations.] Not given in 1911-12.

37. **Shakespeare.** Throughout the year, credit three hours a term. Prerequisite course 2 or 22. Professor STRUNK. M W F, 10, Goldwin Smith 164.

A study of representative plays, together with a survey of the Elizabethan period and its literature.

38b. **Eighteenth Century Poetry.** Second term, credit three hours. Prerequisite course 2 or 22. Dr. MONROE. T Th S, 12, Goldwin Smith 160.

The history of English poetry through the eighteenth century; study of Pope, Thomson, Gray, Goldsmith, and Burns, and readings from the lesser poets; the beginnings of the romantic movement.

41. The English Drama to 1642. Throughout the year, credit three hours a term. Open to upperclassmen. Assistant Professor ADAMS. T Th S, 11, Goldwin Smith 163.

First term: a study of the origin of the drama, miracles, moralities, interludes, and the first regular comedies and tragedies. Second term: a study of Elizabethan society and playhouses, characteristic plays of Lyly, Peele, Kyd, Greene, Marlowe, Jonson, and Beaumont and Fletcher; assigned readings in other representative dramatists.

[48. American Literature. Throughout the year, credit three hours a term. Prerequisite course 2 or 22. Assistant Professor PRESCOTT.

First term: the growth of American literature; Irving, Bryant, Cooper, and Poe. Second term: Emerson, Longfellow, Hawthorne, and Whitman.] Not given in 1911-12.

51. Dante in English. Throughout the year, credit two hours a term. Assistant Professor COOPER. M, 3-5, Goldwin Smith 163.

A certain amount of reading for the sake of literary and historical perspective, followed by a study in detail of selections from the Divine Comedy and the New Life. Open to seniors and graduates.

52. Victorian Poetry. Throughout the year, credit three hours a term. Prerequisite course 2 or 22. Assistant Professor NORTHUP. M W F, 9, Goldwin Smith 163.

A study of the leading works of Tennyson, Browning, Matthew Arnold, Clough, William Morris, Swinburne, and the Rossettis, and of the characteristics of the Victorian era. Open to seniors and graduates.

54. Methods and Materials in the Study of English. Throughout the year, credit two hours a term. Assistant Professor COOPER. Hours to be arranged.

Reading of important treatises on the method of scholarship; a study of the relations between English and similar disciplines; an introduction to the bibliography of English. Applicants must be prepared to read French and German. Open to graduates.

56. The Arthurian Legends. Throughout the year, credit two hours a term. Prerequisite course 11. Assistant Professor NORTHUP. T Th S, 9, Goldwin Smith 156.

Studies in the origin and growth of the Arthurian legends contained in the chronicles and the romances, with some attention to the use of the legends by modern European poets.

[58b. American Literature. Second term, credit two hours. Prerequisite course 48, or other adequate preparation. Assistant Professor PRESCOTT.

A study of the literary relations between England and America.] Not given in 1911-12.

59. Dramatic Structure. Throughout the year, credit three hours a term. Open to seniors and graduates. Professor SAMPSON. M W F, 12, Goldwin Smith 163.

A study of the principles of dramatic construction, based mainly upon English drama of the seventeenth and nineteenth centuries, but with frequent illustration from classical and modern continental drama.

61. The Tudor-Stuart Drama. Throughout the year. Assistant Professor ADAMS.

[62. **The Romantic and Epic Material of the Medieval Irish.** Throughout the year.

The Ossianic cycle of romances and their relation to Macpherson's Ossian; the Epic of the Tain, its form and content.] Not given in 1911-12.

63. **Layamon's Brut.** Throughout the year. Dr. MONROE.

Textual and historical study of the poem with special reference to its connection with the Arthurian legend. Primarily for graduates.

65. **The Principles of Literary Criticism.** Throughout the year, credit two hours a term. Assistant Professor COOPER. W, 3-5, Goldwin Smith.

Primarily designed for those who intend to teach English. Candidates must satisfy the instructor concerning the extent of their previous reading. A study, in part historical, of the most important theories of poetry.

66. **The Epic and the Romance.** Throughout the year. Assistant Professor NORTHUP.

A study of the forms of classic and medieval narrative, and especially of selected Middle English romances and their relations to continental literature.

67. **The Phonology, Inflections, and Metre of Old English.** Throughout the year. Professor STRUNK.

The relation of Old English to Modern English and to German. Readings in Elene or Beowulf.

[68. **American Literature.** Throughout the year. Assistant Professor PRESCOTT. Primarily for graduates.] Not given in 1911-12.

69. **Seminary in Drama.** Throughout the year, credit two hours a term. Professor SAMPSON. M, 3-5, Library, English Seminary Room.

An investigation of the methods of several of the chief Elizabethan and modern dramatists. Ability to read French is required.

Prizes. For the Guilford, Shakespeare, Browning, and Morrison prizes, see the University pamphlet on prizes. Copies may be obtained from the Registrar.

The subjects for the Corson Browning Prize competition and for the Barnes Shakespeare Prize competition will be duly announced.

ORATORY

1a. **Public Speaking.** Repeated in second term, credit three hours. First term.

Sec. 1, M W F, 9, Goldwin Smith 24. Mr. FALLIS.

Sec. 2, M W F, 10, Goldwin Smith 24. Assistant Professor EVERETT.

Sec. 3, M W F, 12, Goldwin Smith 24. Assistant Professor EVERETT.

Second term: T Th S, 11, Goldwin Smith 21. Mr. ———.

Designed to give the student the fundamentals of speech preparation and to help him to acquire a simple, direct manner of speaking. Original speeches and interpretation of selections. Individual instruction will be given by appointment by Messrs. EVERETT, FALLIS, BROWN, and ———.

Students who elect this course should apply at Goldwin Smith 25, on Wednesday or Thursday of registration week, for assignment to sections.

The '86 Memorial Prize in declamation is awarded annually in connection with the courses in public speaking. See special pamphlet on prizes.

1b. Public Speaking. Second term, credit three hours. Prerequisite course 1a.

Sec. 1, M W F, 9, Goldwin Smith 24. Mr. FALLIS.

Sec. 2, M W F, 10, Goldwin Smith 24. Assistant Professor EVERETT.

Sec. 3, M W F, 12, Goldwin Smith 24. Assistant Professor EVERETT.

A continuation of course 1a.

2. Special Course for Women. Throughout the year, credit three hours a term. Mr. FALLIS. T Th S, 10, Goldwin Smith 21.

Reading, speaking, and voice training.

4. Public Speaking Advanced. Repeated in second term, credit one hour. Prerequisite course 1b.

Delivery of speeches before the sections of courses 1a and 1b ; individual instruction and criticism.

6. Public Speaking for Engineers. First term, credit two hours. Assistant Professor EVERETT. M W, 12, Goldwin Smith 21.

Engineering students whose work permits are advised to take courses 1a and 1b. Those who take this course in the first term may for the second term continue in course 1b, taking either two or three hours.

8. Voice Training. Throughout the year, credit one hour a term. Mr. FALLIS. M W F, 8:30-9, Goldwin Smith 21.

For the development and improvement of normal voices, and for removal of special defects. Training in action. Individual instruction by appointment.

[10. Reading. Throughout the year, credit two hours a term. Mr. FALLIS.

Oral interpretation of prose, poetry, and dramatic literature. Open, with consent of the instructor, to those who have completed or are taking any one of the foregoing courses in this department.] Not given in 1911-12.

[12a. Brief Making and Debate. First term, credit two hours. Assistant Professor WINANS.

Study of the principles of argumentation and the forms of brief-writing; textbook, discussions, and conferences. Oral arguments based upon written briefs. As soon as announced, the intercollegiate debate question will receive attention. Designed to give training in fairminded discussion, the use of authorities, and the weighing of evidence.] Not given in 1911-12.

[12b. Debate. Second term, credit two hours. Prerequisite course 12a or English 6a. Assistant Professor WINANS.] Not given in 1911-12.

14. Extemporaneous Speaking. Throughout the year, credit two hours. Assistant Professor EVERETT. T Th, 12, and by appointment, Goldwin Smith 21.

Weekly addresses based upon prepared outlines; topics assigned in the fields of American history, politics, and current events; stories and descriptions. One written speech each term. Woodford orations may be worked out in connection with this course.

Open by special permission to upperclassmen who have done satisfactory work in course 1b.

[16. The Written Speech. First term, credit two or three hours. Prerequisite course 1, and sufficient preparation in composition. Assistant Professor WINANS.

Study of the principles of oratory; the writing of speeches with careful attention to both matter and form; practice in delivery.] Not given in 1911-12.

PHILOSOPHY AND PSYCHOLOGY

1. **Introduction to Philosophy.** First term, credit three hours. Professor THILLY and Mr. JONES. M W F, 11, Goldwin Smith 225.

Lectures, discussions, and prescribed reading.

The fundamental problems of philosophy, together with a critical study of the most important solutions that are offered to them by thinkers to-day. The nature and scope of philosophy; its relation to the physical and mental sciences and religion; materialism, idealism; dualism; the double-aspect theory; the mechanical theory of the world; the teleological theory; the theory of evolution; the belief in God; rationalism, empiricism, and criticism; realism and idealism.

2. **Elementary Psychology.** First term, credit three hours. Assistant Professor BENTLEY, Dr. GEISSLER and Mr. BORING. Lectures T Th, 11, Goldwin Smith C, class room work S, various hours.

Intended as an introduction to psychology. A general account of the human mind and of the scientific methods used in the study of mental phenomena.

3. **Logic.** Second term, credit three hours. T Th S, 11, Goldwin Smith C, Professor CREIGHTON and Mr. JONES; T Th S, 9, Goldwin Smith 225, Mr. JONES.

The general character of the thinking process, its laws of development, and the methods by which thought actually proceeds to solve the problems presented to it; the analysis of logical arguments and the detection of fallacies, in both the deductive and the inductive processes of reasoning. Creighton's Introductory Logic will be used as a text-book.

4. **The Fine Arts: their Philosophy and History in Outline.** First term, credit three hours. Professor HAMMOND. T Th S, 10, Goldwin Smith 227.

An elementary course on esthetics. Lectures, assigned readings, and examinations. An historical survey of the more important branches of art and the psychology of the appreciative feelings and the esthetic judgment.

5. **Ethics.** First term, credit three hours. Professor THILLY and Mr. JONES. M W F, 9, Goldwin Smith 225.

Lectures and discussions.

The nature and methods of ethics; theories of conscience; analysis of conscience; the ultimate ground of moral distinctions; the teleological conception; hedonism; energism; critique of hedonism; the highest good; optimism and pessimism; free will and determinism. Thilly's Introduction to Ethics will be used as a text-book.

6. **Moral Ideas and Practice.** Second term, credit three hours. Professor THILLY and Mr. JONES. M W F, 9, Goldwin Smith B.

Lectures, discussions, and prescribed reading.

The development of moral ideas and practices from primitive times to the present, with an examination of the fundamental virtues and duties.

7. **The Renaissance.** Second term, credit two hours. Professor HAMMOND. T Th, 10, Goldwin Smith 227.

Lectures and assigned readings. An elementary study of the Renaissance, with especial reference to the fine arts, the rise of humanism, and the beginnings of modern philosophical and political theories.

8. **The Relations between Philosophy and Literature during the Nineteenth Century.** Second term, credit one hour. Professor ALBEE. S, 10, Goldwin Smith 221.

The general influence of philosophical conceptions, and particularly of German idealism, upon certain British and American writers of the nineteenth century. The general relations between philosophy and literature, and the leading philosophical conceptions of eighteenth and nineteenth century thought. Coleridge, Wordsworth, Shelley, Browning, Carlyle, Emerson, and Whitman from the point of view of their philosophical significance.

9. **Experimental Psychology.** Throughout the year, credit, first term, three hours; second term, two or three hours. Prerequisite course 2. Assistant Professor BENTLEY, Dr. GEISSLER, and Mr. BORING. M W F, 3, Morrill, Psychological Laboratory.

This course may be entered either in the first or in the second term. Qualitative experiments upon sensation, affection, attention and action, perception and idea, and the association of ideas. Text-book, Titchener's *Experimental Psychology*, part i. Quantitative: verification of Weber's Law in the various departments of sense, determination of stimulus limens, the psychophysics of selective and volitional action (compound reaction experiments), etc. Text-book, Titchener's *Experimental Psychology*, part ii. Experiments in comparative psychology may, at the discretion of the department, be pursued during one term.

10. **History of Philosophy.** Throughout the year, credit three hours a term. Professor CREIGHTON. T Th S, 9, Goldwin Smith 225.

Intended primarily for the general student who wishes to know something of the history of thought and of the influence that philosophical ideas have exerted in the development of civilization. The history of philosophical speculation from its origin among the Greeks to the present time; the various philosophical systems in their relation to the science and general civilization of the ages to which they belong, and their application to social, political, and educational problems; the speculative problems of the present century, and especially the philosophical meaning and importance of the notion of evolution or development. Reading will be assigned from time to time, but there will be no class text-book. An elementary course, but not open to students below the junior year.

11. **History of Ancient and Medieval Philosophy.** First term, credit three hours. Professor HAMMOND. T Th S, 11, Goldwin Smith 227.

Lectures and assigned readings, including selected dialogues of Plato. An introduction to philosophy from the historical point of view. The history of philosophical ideas in Greece, Rome, the Middle Ages, and the early Renaissance treated in connection with the civilization of these periods.

[11a. **Platonism.** Second term, credit two hours. Professor HAMMOND.

Reading of the dialogues in English translation; discussions and lectures on Plato's philosophy. The dialogues to be read are the *Apology*, *Crito*, *Phædo*, *Meno*, *Lysis*, *Protagoras*, *Phædrus*, and *Republic*.] Not given in 1911-12.

12. **The Theory of Evolution: its History and Significance.** Throughout the year, credit one hour a term. Mr. JONES. F, 12, Goldwin Smith 227.

The history of the theory of evolution from the first appearance of the concept among the Greeks to its formulation in modern times by Darwin; the recent modifications of the theory, and the application of the evolutionary method to the various sciences, with special attention to its bearing on ethics, sociology, and religion; an estimate of the significance of the evolutionary point of view for a theory of the world as a whole.

Intended primarily for undergraduates. No acquaintance with the history or special terminology of philosophy is presupposed.

13. **Origin and Development of Religious Ideas.** First term, credit two hours. Mr. JONES. T Th, 12, Goldwin Smith 231.

The origin of religious belief and the conditions of its development, with a brief examination of various forms of primitive religion; the history and significance of the more highly developed religions, such as Brahmanism, Buddhism, Judaism, Mohammedanism, and Christianity.

[14. **Problems of the Philosophy of Religion.** Second term, credit two hours. Mr. JONES. T Th, 12, Goldwin Smith 221.

Some of the main problems of the philosophy and psychology of religion; the philosophical basis of theism; the nature of religion and its relations to morality and to science.] Not given in 1911-12.

15. **Reading of German Psychology.** Throughout the year, credit one hour a term. Dr. GEISSLER. M, 11, Morrill Hall, Psychological Lecture Room.

Translation of Ebbinghaus, *Abriss der Psychologie* (2nd edition, 1909). The primary aim of this course is to assist toward the accurate rendering of German psychological literature. Some emphasis will be laid upon the interconnection of the various part-problems of the science in order to gain a general view of the whole system of psychological facts.

16. **Rapid Reading of German Philosophy.** Throughout the year, credit one hour a term. Professor HAMMOND. T, 2, Goldwin Smith 220.

The primary aim of this course is to aid students in acquiring a knowledge of German philosophical terminology and facility in the translation of philosophical prose. The texts for 1911-1912 will be Windelband's *Platon* and Nietzsche's *Morgenröte*.

17. **Sources of Ancient and Medieval Philosophy.** Second term, credit two hours. Professor HAMMOND. M W, 11, Goldwin Smith 231.

Critical examination of the sources, lectures on historical problems, and discussions.

Primarily for graduates and open to seniors only by special permission.

[18. **Types of Metaphysical Theory.** First term, credit three hours. Prerequisite course 13 or the equivalent. Professor CREIGHTON.] Not given in 1911-12.

19. The Development of Modern Philosophical Problems. First term, credit three hours. Prerequisite course 10 or the equivalent. Professor CREIGHTON. T Th S, 12, Goldwin Smith 221.

A review and an interpretation of the leading philosophical ideas of modern schools and systems, with the purpose of tracing the evolution of philosophical conceptions, especially during the seventeenth and eighteenth centuries, in the light of the various scientific, social, and religious problems with which they are connected. Intended for graduates and seniors already acquainted with the main facts of the leading modern systems.

20. History of Ethics, Ancient, Medieval, and Renaissance. First term, credit two hours. Professor HAMMOND. M W, 11, Goldwin Smith 220.

Lectures and assigned readings. A history of moral ideals and reflection in antiquity, the Middle Ages, and the Renaissance, treated in connection with social and political institutions. Primarily for seniors and graduates.

21. History of Modern Ethics. Second term, credit two hours. Professor ALBEE. M W, 11, Goldwin Smith 220.

The history of modern ethics with special reference to the development of the commonly recognized methods of ethics. The history of British ethics will receive particular attention, as illustrating the gradual differentiation of ethics as an independent science or philosophical discipline. Primarily for graduates.

22. Psychology of the Intellectual Functions. Second term, credit three hours. Prerequisite course 2. Dr. GEISSLER. Lectures, T Th, 11; discussions and recitations, S, 11. Morrill, Psychological Lecture Room.

A theoretical and experimental examination of the higher intellectual functions, memory, association, imagination, and thought; demonstrations and short practical exercises designed to show the general significance of these mental functions in human experience.

23. General Psychology. Throughout the year, credit three hours a term. Prerequisite course 2, and either 9 or 22. Assistant Professor BENTLEY. M W F, 12, Morrill, Psychological Lecture Room.

An intermediate course in human psychology which aims to derive from historical and current writings a coherent account of mind and to explain the relations which psychology sustains to the biological and social sciences.

24. Psychology of Special Actions. First term, credit two hours. Prerequisite course 2, and either 9 or 22. Dr. GEISSLER. M W, 10, Morrill, Psychological Lecture Room.

A brief review of the reaction experiments; the mental processes involved in such special actions as speaking, singing, reading, writing, musical performance, and games of skill; the analysis and description of mental work, and the consideration of practice, fatigue, rest, and recovery.

25. Psychological Problems and Studies. Throughout the year, credit one to five hours a term. Prerequisite courses 2 and 9. Assistant Professor BENTLEY, Dr. GEISSLER, and Mr. BORING. Hours to be arranged, Psychological Laboratory.

Simple laboratory problems, historical studies, and essays.

[26. Advanced Ethics. Throughout the year, credit two hours a term. Professor THILLY. Lectures, reading, discussion, and essays. The study

and criticism of the ethical theories of Bentham, J. S. Mill, Sepencer, and Sidgwick.] Not given in 1911-12.

[27. **The Republic of Plato.** Throughout the year, credit three hours a term. Professor HAMMOND.

Reading of the Greek text. This course is intended for students of Greek literature as well as of Greek philosophy.] Not given in 1911-12.

28. **Aristotle's Ethics.** Throughout the year, credit three hours a term. Professor HAMMOND. M W F, 9, Goldwin Smith 220.

Reading of the Greek text. The Nicomachean Ethics will be read and interpreted in connection with Aristotle's political theories.

Open to graduates and, by permission, to seniors.

29. **Modern Idealistic Theories of Ethics.** Throughout the year, credit two hours a term. Professor THILLY. W F, 10, Goldwin Smith 220.

30. **Empiricism and Rationalism.** First term, credit three hours. Professor ALBEE. T Th S, 11, Goldwin Smith 220.

Lectures, discussions, and essays. The empirical movement as represented by Locke, Berkeley, and Hume, and the rationalistic movement as represented especially by Descartes, Spinoza, and Leibniz, with reference to their distinctive methods. Locke's Essay (Bohn edition, 2 vols.), Hume's Treatise of Human Nature (Clarendon Press), and Leibniz's Philosophical Works (Duncan's translation, Tuttle, Morehouse, & Taylor, New Haven). Primarily for graduates.

31. **The Critical Philosophy of Kant.** Second term, credit three hours. Professor ALBEE. T Th S, 11, Goldwin Smith 220.

Lectures, discussions, and essays. A study of the Critique of Pure Reason (Müller's translation), with frequent references to standard commentaries and to the more recent literature on the subject; the relation in which the three Critiques of Kant stand to each other. Primarily for graduates.

[32. **Early Rationalism: Spinoza and Leibniz.** First term, credit three hours. Professor ALBEE. Lectures, discussions, and essays. Primarily for graduates.] Not given in 1911-12.

33. **German Pessimism, with special reference to Schopenhauer.** First term, credit three hours. Professor ALBEE. M W F, 12, Goldwin Smith 220.

Lectures, discussions, and essays. Instruction will be mainly by lectures, but the student will be expected to read Schopenhauer's World as Will and Idea (in the Haldane and Kemp translation, published by Trübner & Co.). This representative work will be treated somewhat in detail in the lectures. the ethical and social significance of modern pessimism will be discussed, and the philosophy of Nietzsche will be examined. Primarily for graduates.

[34. **Problems and Methods in Recent Philosophy.** Through ut the year credit two hours a term. Professor ALBEE.

Lectures, reading of prescribed authors, and discussions. Primarily for graduates.] Not given in 1911-12.

35. **Logical Theory.** Throughout the year, credit two hours a term. Professor ALBEE. T Th, 12, Goldwin Smith 220.

Lectures, reading of prescribed authors, and discussions. A careful examination of Bosanquet's Logic, or the Morphology of Knowledge, and a comparison of the method there developed with related and opposing methods

employed by other important contemporary writers on logical theory. Primarily for graduates.

36. **Seminary in Logic and Metaphysics, Post-Kantian Idealism.** Throughout the year. Professor CREIGHTON. F, 10-12, Goldwin Smith 231.

37. **Seminary in Ethics.** Investigation of special problems. Throughout the year, credit two hours a term. Professor THILLY. M, 7.30 P. M., Goldwin Smith 220.

38. **Seminary in Ancient and Medieval Philosophy.** Throughout the year, credit two hours a term. Professor HAMMOND. W, 3-5 (or hours to be arranged), Goldwin Smith 220.

The work in 1911-12 will be devoted to the reading and discussion of selected dialogues of Plato and the Politics of Aristotle in English translations.

39. **Seminary in Psychology.** Throughout the year, credit two hours a term. Assistant Professor BENTLEY. Morrill, Psychological Lecture Room. Hours to be arranged.

Problems in psychological theory. Essays and reports. Advanced work upon experimental problems may also be included.

THE SCHOOL OF EDUCATION

The School of Education was established in 1907 by the Board of Trustees for the purpose of providing professional training, both theoretical and practical, to all persons who are looking forward to teaching, or who are actually engaged in the work.

The School offers courses of instruction for three classes of students:

A. Graduate students. For these are intended courses described as primarily for graduates. These are planned to meet the needs of college graduates that are preparing themselves for positions of leadership in education, as professors of education, superintendents of school systems, and directors or supervisors of special phases of school work. By completing a satisfactory amount of work in education and in such other departments of instruction as each case may demand, these students may receive the degree of Master of Arts or of Doctor of Philosophy.

B. Undergraduates. The distinctive work offered in the School of Education for prospective teachers in secondary schools consists of the courses on the history of education, principles of education, educational psychology, school hygiene, and special methods in teaching the subjects in which the student chooses to specialize. By far the largest share of preparation for high school teaching consists of the regular studies of a four years' course in Arts and Sciences. It is expected therefore that the student will give the major portion of his time to the studies in the department or departments that he elects. Further, certain subjects are of such importance for the general culture of all teachers that they are necessary parts of every one's course. Such subjects are physiology, psychology, logic, elementary economics, and at least one foreign language. Beyond all in importance is the ability to speak and write English with accuracy and facility. Students registered in the College of Arts and Sciences have the opportunity of taking work amounting in all to one year's study in any of the other colleges of the University. This arrangement permits any student

to prepare himself for teaching one or more of the so-called special subjects to which so much attention is now paid, such as drawing, manual training, industrial and agricultural education, music, and nature study.

C. Special students. Persons of mature age that either cannot or will not qualify as candidates for a regular university degree, may be admitted to study whatever subjects they wish to pursue. Special courses will be laid out for them, and upon the satisfactory completion of these they will receive certificates indicating what they have done.

Agriculture. There is now an important movement looking to the introduction of the science of agriculture as a part of the high school system of the state.

Students that wish to qualify in this field should confer with the Director of the School of Education and Director L. H. Bailey in arranging their work.

NEW YORK STATE TEACHERS' CERTIFICATES

The New York State Education Department grants two kinds of certificates to graduates of the College of Arts and Sciences:

1. The College Graduate Limited Certificate. This will be given at graduation. It is a license to teach in any school in the state except the primary and grammar grades of city schools and is good for two years. It will then be renewed if the holder shall pass state examinations in psychology, history of education, principles of education, and methods of teaching.

2. The College Graduate Professional Provisional Certificate. This is granted at graduation to students that have completed in the School of Education courses approved by the State Department. It is a license to teach for three years in any grade of any school in New York State, and may then be made permanent upon presentation of a certificate of three years' successful teaching.

The following studies are prescribed by the State Department for students that wish the professional certificate: psychology, general and educational, ninety hours; history and principles of education, ninety hours; methods in teaching, sixty hours; observation, twenty hours.

This requirement may be met at present by completing the following courses: Philosophy 2 (psychology), Education 1, 3, 4, 5.

INDUSTRIAL EDUCATION

The following course is prescribed for students planning to become teachers in the field of industrial education.

FIRST YEAR					
First Term			Second Term		
Subject		Hours	Subject		Hours
English	4		English	4	
German	6 or 5		German	3 or 5	
Mathematics:			Mathematics (Adv. Algebra)	5	
Solid Geometry	3		Physics:		
Trigonometry	3		Course 1	4	
Drawing	3		Course 5	2	

SECOND YEAR

Psychology	3	Educational Psychology	4
Economics (Course 51).....	5 or 0	Economics (Course 51).....	0 or 5
Chemistry (Course 1).....	6	Chemistry (Course 6).....	5
Drawing	3	Woodworking	3
Physics (Course 10).....	0 or 4	Physics (Course 10).....	4 or 0

THIRD YEAR

History of Education.....	4	Principles of Education	4
American History (32).....	3	American History (33).....	3
Political Science (66a).....	3	Political Science (66b).....	3
Forge Work	2	Foundry Work.....	2
*Elective	6	*Elective	6

FOURTH YEAR

School Hygiene	2	Elementary Education.....	2
History of Economics.....	4	History of Economics.....	4
Machine Work.....	2	Machine Work.....	2
Principles of Mnfg.....	2	Industrial Organization	2
*Elective	8	*Elective	8

HOME ECONOMICS

For students wishing to qualify as teachers of Domestic Science, the following course is arranged:

FIRST YEAR

First Term		Second Term	
Subject	Hours	Subject	Hours
English I	4	English I	4
German.....	5	German.....	5
Biology I.....	3	Biology I.....	3
Chemistry I.....	6	Chemistry 6.....	5
<hr/>		<hr/>	
18		17	

SECOND YEAR

Physics I.....	4	Chemistry	6
Physics 5.....	2	Bacteriology.....	3
Psychology	3	Psychology (Educational).....	4
Physiology 3.....	3	Drawing 2.....	2
Drawing I.....	2	H. Econ. Foods 3.....	4
H. Econ. Foods 3.....	4	<hr/>	
<hr/>		<hr/>	
18		19	

*All elective work must be chosen with the advice and approval of the Director of the School of Education.

THIRD YEAR

Political Science 55.....	3	Political Science 51.....	5
History of Education.....	4	Principles of Education.....	4
H. Econ. Nutrition 6.....	4	H. Econ. Nutrition 6.....	4
H. Econ. House Plans 9.....	3	H. Econ. Home Decoration 16.....	3
H. Econ. Sanitation 4.....	2		
	—		—
	16		16

FOURTH YEAR

H. Econ. Household Management		H. Econ. Household Management	
14.....	2	14.....	2
H. Econ. Seminary 23.....	1	H. Econ. Seminary 23.....	1
School Hygiene.....	2		
Elective		Elective	

THE SCIENCE AND ART OF EDUCATION

1. **Principles of Education.** Second term, credit four hours. Prerequisite courses Philosophy 2, Education 4. Professor DEGARMO. M T W Th, 2, Goldwin Smith 234.

An introduction to the general theory of education, in both its individual and its social aspects. Social and individual bases of modern education; basis for selection of studies; fundamental differences between the sciences and the humanities; function and worth of the various studies; their organization into curricula; vocational courses; principles underlying scientific methodology, such as the acquisition of facts at first and at second hand, the use of problem, hypothesis, and analogy, explanation in the form of cause, classification or generalization, the inductive approach, the deductive approach, application, etc. Text-book, DeGarmo's Principles of Secondary Education, volumes I and II.

[2. **Present Problems in Education.** Second term, credit one hour.

A course of lectures on important problems in education. They will be given partly by members of the Cornell University faculty and partly by invited guests.] Not given in 1911-12.

2a. **Industrial Education.** Second term, credit one hour. F, 2, Goldwin Smith 234.

A course of lectures on modern industry, its development and the relation to it of education. These will be given in part by members of the Cornell faculty and in part by specialists from abroad.

3. **History of Education.** First term, credit four hours. Prerequisite courses Philosophy 2, Education 4. Professor DEGARMO. M T W Th, 2, Goldwin Smith 234.

A general survey of the history of education. It will follow in the main the topics and readings prescribed in the syllabus of the New York State Education Department for the guidance of college graduates. Special emphasis

is laid upon the following topics: the education of the Greek people; the rise and development of humanism; the rise and development of science and scientific methods in education; the doctrines of educational reformers; the development of modern systems of education. Monroe's Text-book in the History of Education.

4. Educational Psychology. Second term, credit four hours. Prerequisite course Philosophy 2. Assistant Professor WHIPPLE. M T W Th, 2, Goldwin Smith 256.

A complete system of functional psychology as applied to education, covering the relation of mental to nervous activity, and the large groups of psychophysical functions, volition, cognition, and emotion. Particular reference is given to such topics as nervous plasticity, habit, the nature of educational training and discipline, the psychology of temperament, attention and interest, association, apperception, perception, observation, memory, imagination, conception, judgment, and reasoning. Where feasible, psychological experiments that apply to the work in hand are described or performed. Whipple's Questions in General and Educational Psychology will be used.

5. School Hygiene. First term, credit two hours. Assistant Professor WHIPPLE. M W, 2, Goldwin Smith 256.

Lectures, prescribed reading, and demonstrations.

Construction of school buildings, situation, heating, ventilation, sanitation, followed by the hygiene of instruction, fatigue, school diseases, defects of sight and hearing, medical inspection, hygiene of reading, writing and other studies. Occasional demonstrations of an experimental type. Whipple's Questions in School Hygiene will be used.

Students that are particularly interested in this phase of the work and are competent for experimental investigation may register for systematic work in course 14. For this work students should have taken or be taking course 4, and should afterward take course 6.

6. The Education of Exceptional Children. Second term, credit two hours. Assistant Professor WHIPPLE. M, 3-5, Goldwin Smith 251.

Discussions, reports, and essays. The problem of the atypical child. The psychology and pedagogy of the retarded (idiot, imbecile, moron, laggard), the accelerated (precocious and gifted), and the defective (blind and deaf.)

Students will find it desirable to take also Education 5 and 12, and History and Political Science 57.

7. Elementary Education. Second term, credit two hours. Professor DEGARMO. W, 3-5, Goldwin Smith 251.

Designed for prospective principals, superintendents, and training-teachers in elementary education. Readings, reports, and round-table discussions on elementary studies and methods.

8. Seminary in Mental Development. First term, credit two hours. Prerequisite course 4, and preferably also 1 and 3. Assistant Professor WHIPPLE. M, 3-5, Goldwin Smith 227.

The genetic phases of mental life with special reference to their application to educational problems. Heredity and environment, the nature and utilization of instinctive tendencies, the doctrine of recapitulation, the theory of culture of epochs, physical and mental changes of adolescence, the development of

the sex instinct, the hygiene of sex, social organizations, the teaching of science in the high school, the problems of co-education, etc. The seminary is designed to be of assistance to high-school teachers.

9. The Teaching of Language. Second term, credit two hours. Professor BRISTOL. M W, 12, or at other hours generally convenient to members of the class. Goldwin Smith 137.

An introduction to the study of language as speech, especially with reference to the description of foreign and native sounds. Consideration of the problems of teaching a foreign language; linguistic and literary aims in school work; principles of translating and of composition; the aims of foreign language study in secondary schools; discussions and practice exercises. For all seniors that are planning to teach foreign languages.

10. School Administration. First term, credit two hours. Professor DEGARMO. W, 3-5, Goldwin Smith 251.

Readings, discussions, and reports. The comparative study of school administration in American cities and in foreign countries, especially Germany and England. Primarily for graduates.

11. Seminary in Philosophy of Education. Throughout the year, credit two hours a term. Professor DEGARMO. Th, 3-5, Goldwin Smith 251.

A course in advanced educational theory. It follows in the main Professor MacVannel's outline in the Philosophy of Education, and embraces such topics as the following: evolution and idealism as bases of education; personality and environment; the individual and society; moral institutions; democracy and education; the course of personal development; the school as a social institution; the course of study. Primarily for graduates.

12. Experimental Study of School Children. First term, credit three hours. Prerequisite courses Philosophy 9, Education 4. Assistant Professor WHIPPLE. T, 2-5, Goldwin Smith 248.

A survey of the literature of physical and mental tests, particularly of tests of school children, with reference to purpose, methods, and results. Demonstrations of the more important tests and practice in their administration. The work is based upon Whipple's Manual of Physical and Mental Tests. Students that wish to undertake experimental problems may register in course 14. Primarily for graduates.

13. Seminary in Ethical Training in Secondary Schools. First term, credit two hours. Professor DEGARMO. F, 2-4, Goldwin Smith 251.

Readings, discussions, and reports. Regulative principles of conduct under static and under dynamic social conditions, the adolescent in modern society, moral habits, the function of interest in the moral life, the moral value of school studies, ethical training through athletics, etc. Primarily for graduates.

14. Seminary for Experimental Investigation. Hours to be arranged. Prerequisite course 5 or 12. Assistant Professor WHIPPLE. Goldwin Smith 248.

Solution of minor problems in school hygiene or educational psychology, or of larger problems set as theses for advanced degrees. Primarily for graduates.

[15. **Seminary for the Science and Art of Education.** Throughout the year, one hour a term. Prerequisite courses 1 or 3, and 4. Professor DEGARMO and Assistant Professor WHIPPLE.] Not given in 1911-12.

16. **Aesthetic Education.** Second term, credit two hours. Prerequisite courses 3 and 4. Professor DEGARMO. F, 3-5, Goldwin Smith 251.

The application of æsthetic principles in the development of appreciation for the beautiful in nature and in the useful and fine arts.

HISTORY AND POLITICAL SCIENCE

ANCIENT HISTORY

1. **Ancient History.** Second term, credit five hours for underclassmen, four hours for upperclassmen. Professor SILL. M T W Th F, 9, Goldwin Smith 142.

A general survey of Greek and Roman history, intended primarily for freshmen. Text-books, lectures, collateral readings.

2. **Alexander's Empire and the Hellenistic Age.** Second term, credit two hours. Professor SILL. T Th, 11, Goldwin Smith 134.

Campaigns and conquests of Alexander the Great; the monarchies founded by his successors; the expansion of Hellenism in the East; life at Alexandria and in the cities; the Greek world under the Roman empire; the influence of Greek and of oriental ideas in the Roman world.

3. **Historians of Greece and Rome.** Second term, credit one hour, Professor SILL. S, 9, or as may be arranged. Library, Greek and Latin Seminary Room. Open to graduates and to qualified undergraduates.

4. **Seminary in Greek and Roman History.** Second term, credit two hours. Professor SILL. T, 4, or as may be arranged, Library, Greek and Latin Seminary Room.

Open to graduates and to qualified undergraduates.

The attention of students interested in Ancient History is directed to the course in the History of Asia, given by Professor Schmidt (Semitics 9a).

MEDIEVAL HISTORY

11. **The Middle Ages.** First term, credit five hours. Professor BURR. M T W Th F, 3, Goldwin Smith 245.

A general survey of the history of Christendom from the eve of the Middle Ages to the dawn of the Renaissance (300-1300 A.D.), with especial attention to the life of society and the progress of civilization. Lectures and examinations.

[12. **Renaissance and Reformation.** Second term, credit five hours. Prerequisite course 11 or the equivalent. Professor BURR.

A study of the political, social, and religious history of Christendom during this age of transition (1300-1600 A.D.), with especial attention to the beginnings of modern life and thought. Lectures and examinations.] Not given in 1911-12.

[13. **The Rise of Tolerance.** Throughout the year, credit two hours a term. Prerequisite course 11 or the equivalent. Professor BURR.

A study of the history of intellectual and religious liberty in Christendom.] Not given in 1911-12.

14. **Medieval Life.** First term, credit one hour. Prerequisite course 11. Professor BURR. S, 11, Library, European History Seminary Room.

The reading of some medieval historian, with a view to acquaintance with medieval life and facility in the use of historical Latin. In 1911-12, the subject of study will be the autobiography of Guibert of Nogent (1053-1124). Not open to underclassmen. The course presupposes some knowledge of Latin—as much, for instance, as is needed to read Caesar or Livy.

15. **Seminary in Medieval History.** Second term, one hour. Prerequisite course 11. Professor BURR.

A research class for the critical study of some period, event or phase of medieval history. Open only to seniors and graduates. A reading knowledge of Latin is presupposed.] Not given in 1911-12.

16. **Canon Law.** First term, credit two hours. Prerequisite courses 11, 12. Professor BURR. M Th, 12, Goldwin Smith 245.

The constitutional history of the Christian Church and the elements of ecclesiastical law. Primarily for graduates.

MODERN EUROPEAN HISTORY

21. **Modern European History, 1600 to 1900.** First term, credit five hours for underclassmen, four hours for upperclassmen. Professor CATTERALL. M T W Th F, 9, Goldwin Smith C.

A general survey of Modern European history, intended primarily for freshmen. Text-books, lectures, collateral readings.

23. **English Constitutional History.** Second term, credit five hours. Professor CATTERALL. M T W Th F, 9, Goldwin Smith 142. Text-book, lectures, and readings. Intended primarily for students of the law school.

24. **France from 1715 to 1787.** First term, credit three hours. Professor CATTERALL. M W F, 11. Lectures, readings. Open only to upperclassmen. The student is expected to read French.

25. **The French Revolution, 1787 to 1815.** Second term, credit three hours. Professor CATTERALL. M W F, 11. Goldwin Smith 242. Lectures, readings. Open only to upperclassmen. The student is expected to read French.

26. **Seminary in Modern European History.** Throughout the year, credit two hours. M, 4-6. Library, European History Seminary Room. Open to graduates, and by permission, to qualified seniors.

AMERICAN HISTORY

32. **American History, 1750-1815.** First term, credit three hours. Professor HULL. M W F, 10, Goldwin Smith C.

The revolutionary period and the establishment of independence: the decline of European influence in the affairs of the time. Reference readings, text-books, and lectures.

33. **American History, 1815-1877.** Second term, credit three hours. Professor BRETZ. M W F, 10, Goldwin Smith C.

The period of national expansion, the rise and solution of sectional questions, and recent developments. Reference readings, text-books, and lectures.

34. Economic History of the Colonies, 1600-1788. First term, credit two hours. Professor HULL. T Th, 9, Goldwin Smith 234.

Colonization and settlement as business enterprises, the agricultural conquest of the coast; the competition between slave, indentured, and free labor; the commerce of the British Empire and its relation to the American Revolution. Text-books, readings, reports, and lectures.

35. Economic History of the United States, 1879-1900. Second term, credit two hours. Professor HULL. T Th, 9, Goldwin Smith 234.

Commerce during the European wars; the introduction of manufactures; the westward movement; industrial differentiation of the sections; agriculture for export; the amalgamation of railways and the combination of industries. Text-books, readings, reports, and lectures.

36. Constitutional History of the United States since 1860. First term, credit three hours. Prerequisite courses 32 and 33, or the equivalent. Professor BRETZ. M W F, 9, Goldwin Smith 234. Readings, discussions, and reports.

38. History of New York Province and State. Second term, credit three hours. Prerequisite courses 32 and 33 in this department. Professor HULL. M W F, 10, Goldwin Smith 234.

The political and constitutional development of New York, with some reference to the history of the neighboring colonies. Lectures, assigned readings, and reports.

39a. American Social History: The Settlement of the Middle West. First term, credit three hours. Professor BRETZ. M W F, 10, Goldwin Smith 234.

The early settlers in the Ohio Valley, the admission of states, the disposal of the public lands, and the development of commerce and industry.

Primarily for graduates. Open by permission to qualified upperclassmen.

39b. American Social History: Religious Organizations in the Colonial and Early National Period. Second term, credit three hours. Professor BRETZ. M W F, 9, Goldwin Smith 234.

A study of the denominations and sects which have figured largely in American history, with special attention to the connections between State and Church, the effects of the Revolutionary period upon the various religious organizations, and the leading features of their history since the adoption of the Constitution.

Primarily for graduates. Open by permission to qualified upperclassmen.

40. Seminary. Throughout the year, credit two hours a term. Professors HULL and BRETZ. First meeting, Thursday, October 25, 4 p. m., Library, American History Seminary Room.

History of the German Element in the United States. See GERMAN, course 30.

HISTORY IN GENERAL

41. **The Sciences Auxiliary to History.** First term, credit two hours. Professor BURR. S, 12, Library, European History Seminary Room.

A glance at the aims, the methods, the literature, and the use to history of the more important auxiliary sciences—anthropology, ethnology, archaeology, philology, epigraphy, paleography, diplomatics, sphragistics, numismatics, heraldry, genealogy, chronology, geography. Not open to underclassmen.

[42. **Historical Geography.** Throughout the year, credit one hour a term. Professor BURR.

A thorough study, with map and text, of the geography of history. Not open to underclassmen, and intended for those who have given much attention to history. As the order of topics is not of moment, the course may be begun with either the first or the second term.] Not given in 1911-12.

[43. **Paleography and Diplomatics.** Throughout the year, credit one hour a term. Professor BURR.

The reading of manuscripts and the interpretation of documents. Attention is devoted chiefly to the paleography of Latin and of the languages using the Latin alphabet (e. g., English, French, German, Italian). The course is an actual study of the manuscripts and facsimiles in which the University is rich.] Not given in 1911-12.

45. **Historical Method.** First term, credit two hours. Professor BURR. S, 9-11, Library, European History Seminary Room.

History: its nature, its scope, its materials, its methods. Open only to seniors and graduates, and intended especially for those who are looking forward to the teaching of history or to historical research.

COURSE FOR TEACHERS

[46. **The Teaching of History.** Second term, credit two hours. Professor BURR with aid from his colleagues.

Open only to seniors and graduates who are specializing in history.] Not given in 1911-12.

POLITICAL SCIENCE

51. **Elementary Economics.** Repeated in second term, credit five hours. Professor WILLCOX, Drs. USHER and SABY, and Messrs. LAGERQUIST, TURNER, and ———. M, 11, 12, Sibley Dome; T W Th, F 8, 10, 11, 12, Goldwin Smith.

A general introduction to economics and a preparation for further studies in any department of political science. One lecture each week and four hours of class-room discussion of text-books and assigned questions or supplementary reading. For section assignments and other information apply at Goldwin Smith 260.

52. **Economics.** Assistant Professor BAUER.
See the announcement of Sibley College.

[53a. **Political Institutions.** First term, credit three hours. Professor JENKS. M W, 10. Recitation hours to be arranged. Goldwin Smith 142.

The principles of politics. Nature and historical development of political institutions. The constitutional and administrative laws of the United States and of Great Britain studied with special reference to their practical working. Lectures, and discussions twice a week, with library work and recitations once a week.] Not given in 1911-12.

[53b. **Comparative Politics.** Second term, credit three hours. Professor JENKS. M W, 10. Recitation hours to be arranged. Goldwin Smith 142.

Sketch of the constitutional and administrative laws and of the political institutions of the leading nations of Continental Europe, with especial reference to their relations to present political problems in the United States. A continuation of course 53a, and preferably to be taken after that, though it may be elected independently. Lectures, text-book, and discussions twice a week, with library once a week for two hours.] Not given in 1911-12.

[57. **Methods of Modern Philanthropy; Criminology and Social Progress.** Throughout the year, credit three hours a term. Lectures, T Th, 9, Goldwin Smith 264; S, 9, Goldwin Smith 269.

First term, problems of charities: the pauper, the feeble-minded, the insane, and dependent children, and the best methods of dealing with them. Second term, problems of crime: the criminal, jails, prisons, reformatories; and preventive and educational measures now developing for the betterment of social conditions. Visits to institutions in the neighborhood. Laboratories in charitable statistics and reports.] Not given in 1911-12.

(Seniors may take one or two additional hours by registering in course 98 and those especially interested in philanthropy should take Education 6).

58. **Corporations.** First term, credit two hours. Prerequisite course, Elementary Economics 51. Mr. LAGERQUIST. W F, 9, Goldwin Smith 264.

A brief survey of the development and organization of corporate organizations from the legal and economic standpoint; the present methods of promotion, organization, and financing of some typical corporations; the problems of dissolution, insolvency, receiverships and reorganization; the relation of the corporation problem to the tariff, wages, prices, and other social problems; the public regulation and control of corporations.

[62. **Principles of Business Management.** Throughout the year, credit two hours a term. Professor JENKS. M W, 11, Goldwin Smith 142.

The methods employed in organizing and financing modern business corporations and especially the general methods of management,—cost-keeping, price making, advertising, selling, buying, correspondence, shipping, relations with laborers, with the stock market, with the public, and similar topics as viewed from the point of view of the business manager of "trusts" and large enterprises. The main purpose of the course is to note the way in which the general principles of economics are seen and applied in actual business life. Lectures and discussions. Sections for recitations, one hour a week. Hours to be arranged.] Not given in 1911-12

64. **Money, Credit, and Banking.** Throughout the year, credit four hours a term; without laboratory work, three hours a term. Prerequisite course 51. Course 69 is recommended, though not required, as a preliminary course. Professor KEMMERER. T Th S, 10, and two hours laboratory to be arranged, Goldwin Smith 264.

The work of this course will be divided into three parts: (a) a study of the principles of money, credit, and banking; (b) a study of the exemplification of those principles in the monetary and banking history of certain countries; (c) a study of present day currency and banking problems in the United States. Lectures, discussions, and laboratory work.

65a. The Industrial Revolution in England, 1700-1850. First term, credit three hours. Prerequisite course 51 previously or concurrently, or work in European History. Dr. USHER. M W F, 12, Goldwin Smith 264.

The topography and resources of England, the Industrial Revolution, commercial expansion in the 18th century, the history of the Bank of England, the rise of London as a world metropolis.

65b. Social and Economic Problems of the 19th Century in England. Second term, credit three hours. Prerequisite course 51, previously or concurrently. Dr. USHER. M W F, 12, Goldwin Smith 264.

The course can be followed most profitably by students who have taken course 65a, but it may be elected independently. The history of English Agriculture, 1700-1907; the Poor Laws, 1834 and 1909; the coming of free trade, 1776-1846; railroads and rate-making; Germany and the industrial supremacy of England.

[66a. Labor's Problems and Progress. First term, credit three hours. Prerequisite course 51. T Th S, 11, Goldwin Smith 264.

Progress of the workers in Europe and America, conditions, wages, hours, methods of remuneration, plans for the betterment of factories and homes, influence of labor unions on wages, on industry, and on national life. Not open to underclassmen.] Not given in 1911-12.

[66b. Social Reforms and Projects. Second term, credit three hours. Prerequisite course 51.

History and growth of the more radical modern plans for changing industrial conditions; program and spirit of the socialistic parties in Europe and America. Best taken as a continuation of 66a, but may be separately elected.] Not given in 1911-12.

67. Business Law. First term, credit two hours. Assistant Professor BAUER and Mr. LAGERQUIST. T Th, 12, Goldwin Smith 264.

The principles of contract, with special reference to sales of goods, insurance, credits, and loans, and commercial papers; a survey of the law of agency, master and servant, business associations, and real and personal property and conveyancing. Designed primarily to meet the needs of students entering business, not law, as a profession.

68. Railway Transportation. Second term, credit three hours. Prerequisite course 51. Assistant Professor BAUER. T Th S, 12, Goldwin Smith 264.

A brief outline of railway development in the United States; the organization and management of the business; various problems of railway finance, especially those connected with capitalization, stock watering, rate-making, competition and consolidations; a survey of railway legislation, and the problem of government control.

69. Financial History of the United States. First term, credit three hours. Prerequisite course 51. Professor KEMMERER. T Th S, 11, Goldwin Smith 269.

An historical study of public revenues and expenditures, of public debts, and of currency and banking in the United States, during the national period. This course is preliminary to courses 64 and 70 and is recommended to all students that intend to take either of these courses.

70. Public Finance. Second term, credit three hours. Prerequisite course 51. Course 69 is recommended, though not required, as a preliminary course. Professor KEMMERER. T Th S, 12, Goldwin Smith 269.

A study of the principles of government revenue, government expenditure, and government debt, with particular reference to present day problems of taxation in the United States.

71. Investments. Second term, credit two hours. Prerequisite course 51. Mr. LAGERQUIST. W F, 9, Goldwin Smith 256.

An analysis of general market conditions and the underlying principles which govern the value of investments; the relation of speculation to investments; the relative merits of the different kinds of investments, particularly of city and farm mortgages, of national, state, and county bonds, and of public utility, railway, industrial, mining, and irrigation securities; the investments of savings banks, trust companies, and insurance companies together with legal regulations.

72. Accounting. First term, credit three hours. Prerequisite course 51. Assistant Professor BAUER. T Th S, 9, Goldwin Smith 256.

Modern double-entry book-keeping and accounting principles. The theory of debits and credits; the nature of individual accounts, as of capital, expense, income, interest, depreciation, etc.; the adjustment and closing up of accounts and the drawing up of the balance sheet. The balance sheet, with special reference to valuing the several items; stocks and bonds, with the basis of their issue and treatment in the accounts; earning and dividends, how calculated and how treated in the accounts; cost-keeping, its principles, and its importance in modern business.

73. Insurance. Second term, credit three hours. Prerequisite course 51. Assistant Professor BAUER. T Th S, 9, Goldwin Smith 256.

(a) Life insurance: its purpose and importance; the construction of mortality tables; the calculation of premiums and reserves; loading; policies and policy conditions; business organization and finance; taxation and state regulation. (b) Fire insurance: its importance in modern business; fire hazards; the principles and difficulties of fire rating; business organization and finance; current fire insurance problems.

74. Municipal Government. Second term, credit three hours. Dr. SABY T Th S, 8, Goldwin Smith 256.

A study of the form and functions of city government; social and political problems of the modern city; relation of the city to the state and to its public utilities. Lectures, assigned readings, and special reports.

[75a. Race and Immigration Problems. First term, credit two hours. Professor JENKS and Dr. SABY. Lectures, M W, 12, Goldwin Smith 142. Recitations at hours to be arranged.

A discussion of these questions which are fundamental in the social and political life of the United States and which may profoundly affect its future. The lectures are based upon the work of the United States Immigration Com-

mission. Lectures twice a week with one recitation on lectures. Text-book and collateral reading.] Not given in 1911-12.

[75b. **Modern Questions in International Politics.** Second term, credit two hours. Professor JENKS. M W, 12. Goldwin Smith 142.

A study of leading questions of the day in the field of international politics. The purpose of the course is not only to give general information but also to show the practical application to the study of current events of the principles of international law and politics. Lectures and discussions twice a week, with text-book, collateral reading, and recitation once a week at hours to be arranged.] Not given in 1911-12.

76a. **Demography or Population Statistics.** First term, credit three hours. Prerequisite course 51. Professor WILLCOX. Lectures M W F, 9, Goldwin Smith 256; laboratory, W, 2-4, Goldwin Smith 259.

An introduction to census statistics and registration statistics with practical work in tabulation and interpretation. Statistics is presented as a scientific method or tool useful and necessary in studying the social sciences, a method best approached through its results in this its oldest and most developed field.

76b. **Economic Statistics.** Second term, credit three hours. Professor WILLCOX. Lectures M W F, 9, Goldwin Smith 256; laboratory W, 2-4, Goldwin Smith 259.

A continuation of course 76a, dealing mainly with the agricultural and industrial statistics of the United States. Mature students that have not already had course 76a or its equivalent may be admitted by special permission. The course is an introduction to statistics in its application to more difficult fields, such as production, wages, prices, and index numbers.

77. **Advanced Statistics.** Throughout the year, credit two hours a term. Prerequisite courses 51, 76a, 76b, or the equivalent. Professor WILLCOX. W F, 11, Goldwin Smith 259.

Lectures first upon the history of statistics in Europe, following the works of Wagner, John, Meitzen, and Westergaard, and then upon systematic statistics as exemplified mainly in von Mayr's *Statistik und Gesellschaftslehre*. Studies and reports upon the history of American statistics will be made by members of the class. The recently published sections of von Mayr's third volume will be read and discussed. Some knowledge of German is presupposed and some practice in reading German will be secured.

78. **International Law.** First term, credit three hours. Dr. SABY. T Th S, 10, Goldwin Smith 256.

The nature and development of international law. The rights and obligations of nations in time of peace. The arbitration movement. The laws of war and neutrality. America's contribution to international law. Specially recommended for students who intend taking course 75b. Text book, cases, assigned readings, and reports.

79. **Commerce.** Second term, credit three hours. Mr. LAGERQUIST. M W F, 10. Goldwin Smith 264.

The development and organization of commerce of the last century, and the influence of geography and economic conditions on trade, with special emphasis on American commerce; the theory of international trade, the

operation and influence of foreign exchange, the present protective tariffs, commercial treaties, reciprocities and navigation policies; ocean transportation, trade promoting institutions, and the consular service.

[80. **The Modern Theory of Distribution.** Throughout the year, credit two hours a term. T Th, 8, Library, Political Science Seminary.

A study of the most notable recent writings and contributions in systematic economics and of the methods of the modern critical school, to secure a deeper insight into the practical reformatory measures of the day. Special subject for 1911-12, the capital and the wealth concepts. Primarily for graduates. Open also to qualified seniors.] Not given in 1911-12.

81. **The Classical Economists.** Throughout the year, credit two hours a term. Prerequisite course 51. Mr. TURNER. W F, 8, Library, Political Science Seminary.

The leading English economists from Adam Smith to Alfred Marshall with particular reference to their influence on American economic thought. Special attention is given to the works of Ricardo, Malthus, Senior, J. S. Mill, and Cairnes. The continuity of thought is traced in relation to the industrial environment.

[84. **Special Problems in Politics.** Throughout the year, credit two hours a term. Professor JENKS. T, 4, Political Science Seminary.

An advanced course dealing with a few fundamental questions, legislative and administrative, that are of especial interest to those studying political reforms. Open only to graduates and to a few specially prepared undergraduates.] Not given in 1911-12.

89. **Currency and Banking Reform in the United States.** Throughout the year, credit three hours a term. Prerequisite courses 51 and 64, or the equivalent. Professor KEMMERER. Hours to be arranged, Library, Political Science Seminary.

This course in 1911-12 will be devoted to a study of proposals for a central bank in the United States. Special attention will be paid to the lessons afforded by European experience. Primarily for graduates. Open to undergraduates only by special permission.

[90. **Research in Labor Problems.** Throughout the year, one to three hours a term. At hours to be determined. Goldwin Smith 269.

Advanced research work in connection with the laboratory exercises of course 66a.] Not given in 1911-12.

91. **Research in Life Insurance.** Throughout the year, credit two or three hours a term. Prerequisite course 73. Assistant Professor BAUER.

For students planning to enter the life insurance business who are or interested in particular life insurance problems.

92. **Research in Finance.** Throughout the year, credit two or three hours a term. Prerequisite courses 51 and either 64 or 70 or other advanced work in finance. Professor KEMMERER. Hours and place to be arranged.

93. **Research in Accounting.** Throughout the year, credit two or three hours a term. Prerequisite course 72. Assistant Professor BAUER. Hours to be arranged.

For students interested in particular accounting problems.

[94. **Research in Politics and in the Economic History of the United States.** Throughout the year, credit one to three hours a term. Professor JENKS. Hours to be arranged, Goldwin Smith 254.] Not given in 1911-12.

A few specially prepared students, primarily graduates, may undertake studies involving original investigation in the fields mentioned.

[98. **Research in Philanthropy.** Throughout the year, one to three hours a term. Hours to be arranged, Goldwin Smith 269.

For students that are doing special work in vocational philanthropy. Studies in the history and statistics of charities and criminology in connection with the laboratory exercises of course 57]. Not given in 1911-12.

99. **General Seminary.** Throughout the year, credit two hours a term. Professors WILLCOX and KEMMERER, and Assistant Professor BAUER. M, 2.30-4.30, Goldwin Smith 269.

For research in the field of the political sciences. Open only to graduate students.

BIBLIOGRAPHY

1. **Introduction to the Use of Books.** First term, credit one hour. Assistant Librarian AUSTEN. Th, 4, Library Lecture Room.

A systematic study of bibliographies, indexes, dictionaries, cyclopedias, etc., including the principles of classification, cataloguing, indexing, and preparing manuscript for printing. Lectures and exercises.

1a. **Laboratory Work.** Second term, credit one hour. Prerequisite course 1. Assistant Librarian AUSTEN. Th, 4, Greek and Latin Seminary Room.

Laboratory work covering the subjects of course 1, and intended for students that wish more of the practical work.

2. **General Bibliography.** Second term, credit two hours. Librarian HARRIS. T Th, 12, Library Lecture Room.

The materials and form of books in ancient times; books in the Middle Ages, block books, early printed books, illustrated by examples of manuscripts and incunabula; book illustration, book-bindings; form-notation; systems of classification and cataloguing; general bibliographical aids. Lectures and reference readings.

MUSIC

The several courses offered by the Department of Music are designed to afford to all students having sufficient native ability, the opportunity to study music as a part of or in addition to the regular college course. The aim is to make musical training contribute to liberal culture. Consequently, attention is mainly directed to practical courses, or courses in so called applied music. All instruction is given in classes.

For students entering college without musical training, the department offers elementary instruction in ear training, sight-reading, musical notation and terminology, harmony and composition, and elements of musical form, which, for performer and for listener, constitute a necessary basis for the proper understanding of the musical literature to be studied.

The department also provides a weekly organ recital, a musical program for the vesper service at Sage Chapel on Sunday afternoons, a course of lectures, a series of chamber concerts, and an elaborate Music Festival, which is given annually about the first of May.

All courses continue through both terms and students are not admitted at the beginning of the second term, with the exception of those who, at entrance, pass the required work of the first term.

1. **Elementary.** Open to all students showing sufficient aptitude to pursue the subject with profit.

Throughout the year, credit two hours a term. Professor DANN. T, 7.15 p. m., Th, 4.45, Sage Chapel.

A thorough course in sight-reading, ear and vocal training, and elementary theory, including a practical knowledge of the major and minor scales. Attendance is required at the morning service at Sage Chapel, for which service the members of this class form a part of the choir.

3. **Intermediate.** Open to students who have completed course 1 or who meet the requirements prescribed in course 1. Throughout the year, credit two hours a term. Professor DANN. W, 4.45; Th, 7.15 p. m., Sage Chapel.

Ear and vocal training, theory, including the study of intervals, triads, music notation and terminology, and the elements of musical form; more advanced sight reading and the study of standard sacred and secular music; the study through the aid of the piano player and the phonograph, of prescribed works selected from the larger compositions. Attendance is required at the morning service at Sage Chapel, for which service the members of the class constitute the regular choir.

5. **Advanced Choral.** Throughout the year, credit two hours a term. Professor DANN, M, 7.15; T, 4.45, Sage Chapel.

Preparation and public presentation of the best choral works, sacred and secular. This course is offered as advanced work to students possessing good singing voices and the ability to read at sight, music of moderate difficulty. The class is limited to one hundred, distributed approximately as follows: thirty sopranos, twenty-two contraltos, twenty tenors, and twenty-eight basses. All vacancies are filled by competition at the beginning of the first term.

Members of this class constitute the choir at the Sunday Vesper Service at Sage Chapel.

6. **Orchestra.** Only a limited number can be admitted. Vacancies will be filled by competition. Throughout the year. Mr. COLEMAN. T Th S, Sibley Dome.

Ensemble study of standard works, including compositions for chorus and orchestra. This course is offered as advanced training for students who play some orchestral instrument sufficiently well to participate creditably in the study and performance of the works to be studied. The orchestra will give several concerts during the year, accompany the advanced choir at the Sunday Vesper Service at Sage Chapel, and participate in the performance of complete works given by the choir during the year.

7. **Harmony.** Open to all students who have completed course 3, or who have done the work prescribed in course 3. Throughout the year, credit two hours a term. Mr. JOHNSTON. T Th, Sage Chapel.

The subject is approached through a course in melody writing. The work requires a thorough knowledge of the major and minor scales and involves the study of intervals, the construction, relation, and progression of chords, and the harmonization of melodies.

8. **Advanced Harmony and Composition.** Open to students who have completed course 7, and to others equally qualified. Throughout the year, credit two hours a term. Mr. JOHNSTON. M W, 3.30, Sage Chapel.

This course is concerned with the analysis of form and with counterpoint in three or more parts.

Individual examinations for admission to all courses, for new students and others not previously classified, will be held as follows:

Vocal Music. Courses 1, 3, and 5, Wednesday, September 27; Thursday, September 28; Friday, September 29, and Saturday, September 30, from 3 to 5, Sage Chapel.

Orchestra. Course 6, Thursday, September 28, and Friday, September 29, from 5 to 6, Sibley Dome.

Harmony. Courses 7 and 8, Thursday, September 28, and Friday, September 29, from 5 to 6, Sage Chapel.

MATHEMATICS

Whenever possible, course 1 should be taken either before or simultaneously with course 3. Of the courses 1 to 7 inclusive, no two may without special permission be taken simultaneously.

1. **Solid Geometry.** Repeated in second term, credit three hours.

First term. M W F, 9, White 27. Assistant Professor SHARPE.

Second Term. T Th S, 10, White 6. Dr. HURWITZ.

Open to all students, but designed especially for those who have entered with the minor requirements in mathematics and are preparing: (a) to teach mathematics in the secondary schools; (b) to take up engineering work later in the course; (c) to specialize in chemistry or physics.

2. **Advanced Algebra.** Repeated in second term, credit five hours.

First term. Daily except S, 10, White 1. Dr. GILLESPIE.

Second term. Daily except S, 9. White 10. Professor McMAHON.

Open to all students, but designed especially for those mentioned under course 1.

3. **Plane and Spherical Trigonometry.** Repeated in second term, credit three hours.

First term. T Th S, 9, White 24. Professor SNYDER.

Second term. M W F, 10, White 5. Dr. McKELVEY.

Open to all students, but designed especially for those mentioned under course 1.

5. **Analytic Geometry and Calculus.** Twenty-four sections, daily except S, first term; daily, second term.

5a. Analytic Geometry. Credit four hours first term.

5b. Differential Calculus. Credit one hour first term, two hours second term.

5c. Integral Calculus. Credit four hours second term.

6a. **Analytic Geometry and Differential Calculus.** Second term, credit six hours. Not open, without special permission, to students who have had no previous training in analytic geometry.

Sec. 1, daily 9, White 28. Professor TANNER.

Sec. 2, daily 11, White 1. Dr. GILLESPIE.

6b. **Integral Calculus.** First term, credit three hours. Prerequisite courses 1a and 1b, or the equivalent. Dr. CRAIG. M W F, 8, White 5. This course covers substantially the work of course 5c.

7. **Analytic Geometry and Calculus.** Throughout the year, credit five hours a term.

7a. **Analytic Geometry.** Credit, four hours first term.

7b. **Differential Calculus.** Credit, one hour first term, two hours second term.

7c. **Integral Calculus.** Credit, three hours second term.

Sec. 1, daily except S, 10, White 8. Professor TANNER.

Sec. 2, daily except S, 8, White 24. Professor SNYDER.

Recommended for students intending to specialize in physics or chemistry.

Examinations for the removal of conditions and incompletes in courses 1-7 are held in block-week at the end of each term, and also along with the September entrance examinations, but at no other time. For further information regarding time and place of these examinations, students should apply to the department.

10. **Teachers Course.** Throughout the year, credit three hours a term. M W F, 11, White 28.

First term, algebra and trigonometry. Selected topics considered historically and critically. Professor TANNER.

Second term, geometry. An analysis of the fundamental basis of logical geometry together with a critical review of the whole subject. Dr. OWENS.

Designed primarily for those students who are preparing to teach mathematics in the secondary schools.

11. **Differential Equations.** Throughout the year, credit two hours a term. Prerequisite course 5 or 7. Dr. OWENS. T Th, 9, White 2.

An elementary course including the solution of the simpler types of ordinary and partial differential equations. The statement of physical problems in the form of differential equations and the applications of boundary conditions to the solutions found.

12. **Mathematics of Physics.** Throughout the year, credit three hours a term. Prerequisite course 5 or 7. Professor McMAHON and Assistant Professor SHARPE. White 10.

May accompany course 11. Includes the transformation of trigonometrical and exponential functions, and the use of imaginaries, simple properties of vectors and their derivatives, line integrals, surface and volume integrals, elementary notions in the calculus of variations and in the theory of probability, and least squares. May be supplemented by directed reading, with individual conferences. The work of each term will be complete in itself.

13. **Projective Geometry.** Throughout the year, credit three hours a term. Prerequisite courses 5 or 7. Professor SNYDER. M W F, 9, White 24.

A comprehensive course on the foundations of projective geometry based upon the treatise of Veblen and Young.

14. **Theory of Probabilities.** Throughout the year, credit two hours a term. Professor McMAHON. White 10.

Theory of probabilities with applications to problems in statistics, theory of errors, life-tables, insurance correlation, etc., to suit individual needs. A knowledge of calculus is not essential.

15. **Advanced Analytic Geometry.** Throughout the year, credit three hours a term. Prerequisite course 5 or 7. Dr. McKELVEY. White 5.

An introduction to the theory of algebraic curves and surfaces. Systems of coordinates, elementary transformations, polar systems, a summary of unicursal curves and of the theory of quadric surfaces.

16. **Modern Algebra.** Second term, credit three hours. Dr. SILVERMAN. Hours to be arranged, White 6.

Determinants; symmetric functions; linear dependence; systems of linear equations; linear transformations; invariants; quadratic forms.

17. **Advanced Calculus,** including elliptic integrals and their application. Throughout the year, credit three hours a term. DR. MILES.

18. **Infinite Series.** First term, credit three hours. Dr. SILVERMAN. Hours to be arranged, White 6.

Sequences and limits; tests of convergence of series; double limits; uniform convergence, continuity, differentiation and integration of series; infinite products; summable series.

19. **Algebraic Curves.** Throughout the year, credit three hours a term. Prerequisite course 13. Dr. CRAIG. White 2.

Conditions which determine a curve, theory of poles and polars, Plücker's numbers, cubic and quartic curves, and finite groups of collineations.

20. **Conjugate Co-ordinates.** Second term, credit three hours. Prerequisite courses 5 or 7. Assistant Professor CARVER. Hours to be arranged, White 21.

A special system of Cartesian co-ordinates applied to the study of metric properties of certain plane figures; the chain theorems for the plane n -line, and the properties of the limaçon and other cycloidal curves.

23. **Theory of Numbers.** First term, credit three hours. Prerequisite courses 1, 2, and 3. Assistant Professor CARVER. Hours to be arranged, White 21. Rational integers. A brief introduction to the theory of quadratic integers will probably be included.

26. **Theory of Functions of a Complex Variable.** Throughout the year, credit three hours a term. Prerequisite course 5 or 7. Professor HUTCHINSON. White 25. Hyperelliptic and abelian functions, with particular reference to the theory and applications of elliptic functions.

26. **Theory of Functions of a Real Variable.** Throughout the year, credit three hours. Prerequisite course 5 or 7. Mr. GILLESPIE. White 1.

A study of the processes of the calculus. It would be to the student's advantage to have had a course such as 17 or 18.

29. **Elementary Mechanics.** Throughout the year, credit two hours a term. Assistant Professor SHARPE. White 27.

A simple exposition of the fundamental principles of the subject. Intended primarily for students that do not intend to specialize in mathematics or in physics. Special attention will be given to practical problems.

30. **Vector Analysis.** Throughout the year, credit two hours a term. Professor McMAHON. White 10.

Classification of vector fields; illustrations and properties of the principal fields; applications to electric fields.

31. **Differential Equations of Mathematical Physics.** Throughout the year, credit three hours. Dr. HURWITZ. White 6.

The derivation of the differential equations, with appropriate boundary conditions which arise in certain problems of mathematical physics; the mathematical properties of solutions and the physical meanings of these properties. Familiarity with the usual tools of accurate work in analysis, such as may be derived from course 17, 18, or 26 is essential. Mathematics 11 and Physics 8, 9 are desirable, though not indispensable, as preparation for the course.

ASTRONOMY

1. **General Astronomy.** First term, credit three hours. No prerequisite, but a knowledge of elementary physics is desirable. Lectures and recitations illustrated with lantern slides and the observatory equipment. Assistant Professor LELAND. M W F, 12, Rockefeller C.

A fundamental course in descriptive astronomy including a comprehensive study of the structure of the universe and the heavenly bodies, their motions, relations, and evolution; methods of investigation; instruments and apparatus.

2. **Observations.** Second term, credit one hour. Prerequisite course 1. Assistant Professor LELAND. One evening a week to be arranged. Fuertes Observatory.

A general study of the constellations, the sun and the planets, double and multiple stars, and nebulae. Star-maps and catalogues, field glasses, and the equatorial telescope.

PHYSICS

1. **Introductory Experimental Physics.** Repeated in second term, credit four hours. Professors NICHOLS and SHEARER, and Mr. GIBBS. M T W Th. First term 9 or 12, second term 12, Rockefeller A.

Entrance physics is not accepted as an equivalent of this course.

5. **Introductory Physics.** Class-room work. Repeated in second term, credit two hours. Messrs. HOWE, FORMAN, RODGERS, AYERS, BUCKLEY, and HOWES. M W, or T Th, Rockefeller, to be assigned.

6. **Introductory Physics.** Class-room work. Repeated in second term, credit four hours. Messrs. MURDOCK, FORMAN, RODGERS, and AYRES. M T W Th, Rockefeller, as assigned.

Examinations for those who were unavoidably absent from either term examination in course 1, 5, or 6, and for those who have conditions to make up, will be held on registration day September 27, 1911, at 2 p. m.

8. **General Physics.** Theory. Repeated in second term, credit two hours. Prerequisite courses 1 and 5 and Mathematics 1. Assistant Professor

RICHTMYER, Dr. NASMYTH, and Messrs. FISHER, GALAJIKIAN, MOLBY, SOMERVILLE, TAYLOR, and——. Two days as assigned, Rockefeller, as assigned.

Text-book work in statics, dynamics, properties of matter, and heat, including thermometry, expansion, calorimetry, radiation, and conduction. Two hours of course 14 must be taken in connection with course 8.

9. **General Physics.** Theory. Repeated in second term, credit two hours. Prerequisite course 8 and the first term of 14. Instructing staff as in course 8. Two days as assigned, Rockefeller, as assigned.

Text-book work. A continuation of course 8. Magnetism and electricity, properties of vapors, and an introduction to the kinetic theory of gases and thermodynamics.

Two hours of course 14 must be taken in connection with course 9.

10. **Introductory Physical Experiments.** Either term or throughout the year, credit one to four hours a term. Especially for students taking 1 and 6, but open to those who are taking or have completed 1, 1 and 5, 6, or the equivalent. Assistant Professors BLAKER and RICHTMYER, and Messrs. GIBBS, GALAJIKIAN, MAYER, TAYLOR, BIDWELL, POWER, and —— . W M S, 8-10.30, M T W Th F, 2-4.30. Rockefeller 220-232.

A shorter course of two hours covering properties of matter, heat, light, sound, magnetism, and electricity may be taken for one term, the student electing two laboratory periods a week, or the course may be extended over a year, one period a week being taken. A longer course of three or four hours may be elected covering the same ground as the two hour course but more in detail, the work being done in one term or distributed over two terms.

14. **Physical Experiments.** Either term or throughout the year, credit one to eight hours a term. Prerequisite courses 1 and 6, or 1 and the two hour course in 10, or the equivalent. May be taken by students that are taking courses 8 and 9. Assistant Professors BLAKER and RICHTMYER, Dr. NASMYTH, and Messrs. FISHER, GALAJIKIAN, MOLBY, SOMERVILLE, TAYLOR, —— and —— . M T Th, 9-12, W S, 8-11, M T W Th F, 2-5. Rockefeller, 250-257.

Physical measurements, properties of matter, mechanics, heat, light, sound, magnetism, and electricity; the adjustment and use of instruments of precision. Results and errors are carefully discussed. Students that are specializing in chemistry are required to take four hours. Other students may elect the desired number of hours.

15. **Photometry and Illumination.** Laboratory work, either term or throughout the year, credit one to four hours a term. Prerequisite courses 1, 6 or 10, and 14. Assistant Professor RICHTMYER. Hours to be arranged, Rockefeller.

A study of candle power and distribution of various sources of artificial light. Various forms of photometers will be investigated and calibrations made. Tests will be made of the illumination within a room under various conditions of lighting.

It is recommended that course 43 should be taken with this course.

16. **Advanced Photometry and Illumination.** Repeated in second term, and throughout the year. Credit, two to six hours a term. Prerequisite course 15. Assistant Professor RICHTMYER. Hours to be arranged. Rockefeller.

A continuation of course 15 along special lines to meet individual needs, or as a general course preparatory to research. Includes heterochromatic photometry, spectrophotometry, and a critical study of the several fundamental photometric methods and standards of illumination.

18. **Theory and Practice of Photography.** Repeated in second term, credit two hours. Prerequisite, the knowledge of chemistry and physics that in general is possessed by those who have completed Chemistry 1 and Physics 1. Professor MOLER and Mr. SOMERVILLE. Lecture, Th, 3.30 and one three-hour laboratory period weekly; M T F, 2-5, or W Th, 9-12, Rockefeller Hall, Lectures in A.

19. **Advanced Photography,** with special reference to its application to research. Repeated in second term, credit two hours. Prerequisite courses 1, 10 or 14, and 18, or the equivalent. Professor MOLER. Rockefeller Hall, Photographical Laboratory.

An attendance equal to six hours per week is required in this course.

20. **Heat.** First term, credit three hours. Prerequisite courses 1, 6, and 10. Assistant Professor BLAKER.

Courses 20-25 are intended for those who desire a more detailed study of the work indicated and who are preparing to teach or to take the advanced courses in theoretical physics which follow. Advanced mathematics is not required but if the calculus has not been taken it is advisable to take it at the same time. Physics 14 and 25 should be taken with 20-23.

[21. **Light.** Second term, credit three hours. Prerequisite courses 1, 6, and 10. Assistant Professor BLAKER.] Not given in 1911-12.

22. **Electricity and Magnetism.** Second term, credit three hours. Prerequisite courses 1, 6, and 10. Assistant Professor BLAKER.

[23. **Properties of Matter.** First term, credit three hours. Prerequisite courses 1, 6, and 10. Assistant Professor BLAKER.] Not given in 1911-12.

[24. **Sound.** Second term, credit three hours. Prerequisite courses 1, 6, and 10. Assistant Professor BLAKER.] Not given in 1911-12.

25. **Advanced Laboratory Practice.** Either term or throughout the year. Credit two to eight hours a term. Prerequisite courses 1, 6, or 10, and at least four hours of 14. Assistant Professor BLAKER. Rockefeller, various rooms.

A laboratory course in general physics for students who desire to teach experimental physics or who desire to prepare themselves for the advanced laboratory courses in general physics which follow. The experiments will be selected to meet the requirements of the individual student.

33. **Alternating Currents.** First term, credit two hours. Prerequisite courses 1, 6 or 10, and 14. Professor BEDELL. T Th, 10, Rockefeller.

A study of the underlying principles of alternating electric currents; the development of graphical methods of analysis as a basis for testing and for the solution of practical problems.

34. **Electrcial Laboratory.** Either term or throughout the year, credit three hours a term. Prerequisite courses 1, 6 or 10, and 14. Professor BEDELL and Mr. GOLDBERG. Daily 9-1, Rockefeller.

General dynamo laboratory practice, the testing of direct and alternating current apparatus and the investigation of special problems. Primarily for seniors.

35. **Advanced Electrical Laboratory.** Either term or throughout the year, credit two to eight hours a term. Prerequisite courses 1, 6 or 10, and 14. Professor BEDELL and Mr. GOLDBERG. Daily 9-1.

Similar to course 34 but of wider scope. The character of the work will be arranged to meet individual needs. Primarily for graduates.

36. **Advanced Alternating Currents.** Throughout the year, credit one or more hours a term, as arranged. Prerequisite courses 1, 6 or 10, 14, 33. Professor BEDELL and Mr. GOLDBERG. Hours as arranged, Rockefeller.

A colloquium on the theory and measurement of alternating currents. For graduates only.

37. **Theses in Applied Electricity.** Throughout the year or second term, credit two to eight hours a term. Prerequisite courses 1, 6 or 10, and 14. Professor BEDELL and Mr. GOLDBERG. To be arranged, Rockefeller.

39. **Design and Construction of Apparatus for Research.** First term, credit two hours. Professor MOLER. Rockefeller Hall.

Lectures and laboratory at hours to be arranged. Primarily for graduates.

40. **Recent Advances in Experimental Physics.** Throughout the year, credit one hour a term. Professor MERRITT. F, 12, Rockefeller B.

Lectures, illustrated by experiments. In 1911-12, a considerable part of the course will be given to the subjects of Conduction in Gases and Radio activity.

41. **The Electric Transmission of Intelligence.** Second term, credit one hour. Prerequisite courses 1, 6 or 10, and 14. Professor NICHOLS. S, 12, Rockefeller B.

[42. **Primary and Secondary Batteries.** Second term, credit one hour. Prerequisite courses 1, 6 or 10, and 14. Professor NICHOLS.] Not given in 1911-12.

A lecture course on the theory of voltaic cells and storage batteries.

43. **Photometry and the Physics of Illumination.** First term, credit two hours. Prerequisite courses 1, 6 or 10, and 14. Professor NICHOLS. T Th, 10, Rockefeller B.

Lectures on the theory of artificial illumination and on methods of determining the temperature, efficiency, and quality of sources of light.

45. **Advanced Laboratory Work in General Physics.** Throughout the year or either term. Prerequisite courses 1, 5, 8, 9, 4 hours of 14, and 25; 1, 6, 4 hours of 14, and 25; or 1, 2 hours of 10, 4 hours of 14, and 25. Professors NICHOLS, MERRITT, and SHEARER, and Assistant Professor BLAKER. Daily, Rockefeller.

46. **Light.** Throughout the year, credit four hours a term. Prerequisite courses 1, 6 or 10, and 14. Professor SHEARER.

Primarily for graduates.

[47. **Heat.** Throughout the year, credit four hours a term. Prerequisite courses 1, 6 or 10, and 14. Professor SHEARER. Hours to be arranged. Rockefeller B.

Production of high and low temperatures with methods of measurement; heat transfer; theory of heat and molecular physics; kinetic theory of matter.] Not given in 1911-12.

Primarily for graduates.

49. **The Application of Mathematics to Physics.** Throughout the year, credit two hours a term. Prerequisite courses 1, 6 or 10, and 14. Professor SHEARER. Primarily for graduates.

50. **Physics Seminary.** Throughout the year, credit two hours a term. Professor NICHOLS. Hours to be arranged, Rockefeller B.

A colloquium in which all members of the teaching staff in physics and all graduate students take part.

51. **Theoretical Physics.** Mechanics and thermodynamics. Throughout the year, credit four hours a term. Professor MERRITT. Probably M T W Th, 8. Primarily for graduates.

[52. **Theoretical Physics.** Electricity and magnetism. Throughout the year, credit four hours a term. Professor MERRITT. Primarily for graduates. Not given in 1911-12.

54. **Thermodynamics.** Throughout the year, credit two or three hours a term. Prerequisite courses 1, 6 or 10, and 14, and Mathematics 1. Physics 20 is advised, though not required, as a preliminary course. Professor TREVOR. Hours to be arranged.

55. **The History of Mechanics.** First term, credit two hours. Mr. FISHER.

For teachers, and students who already have some knowledge of the subject. Discussions on the development of the science and its fundamental ideas, based especially on the work of E. Mach, *The Science of Mechanics*.

56. **The Kinetic Theory of Gases.** Second term, credit two hours. Mr. FISHER.

An intermediate course of discussions based on Boynton's *Kinetic Theory* and Jäger's *Die Fortschritte der Kinetischen Gastheorie*.

CHEMISTRY

INTRODUCTORY INORGANIC CHEMISTRY

1. **Introductory Inorganic Chemistry.** Lectures, recitations, and laboratory. Repeated in second term, credit six hours.

1a. Lectures. First term, M W F, 11, Professor DENNIS and Mr. SUTHERLAND; T Th S, 11, Professor BROWNE and Mr. SUTHERLAND. Second term, M W F, 11. Morse 1.

1b. Recitations (one hour a week to be arranged), and laboratory (two $2\frac{1}{2}$ hour periods a week to be arranged). Professors DENNIS and BROWNE, Mr. WELSH, and Messrs. HOULEHAN, GAUB, NUNEZ, SHERWOOD, CARRUTH, O'BRIEN, and ———.

Entrance credit in chemistry does not carry with it University credit in course 1. If a student entering the University from a preparatory school desires credit in course 1 he must pass an examination set by the department of chemistry. This examination is held both in New York City and in Ithaca on the same day in September as the entrance examination. University credit in course 1 that is obtained by passing this examination does not carry with it entrance credit in chemistry.

Examinations for those who were unavoidably absent from the term examination in course 1, and for those who have conditions to remove in this course, will be held at 2 p. m. on the day before instruction begins in the fall, and also in the month of May at a date to be announced. No special examinations will be given at other times.

ANALYTICAL CHEMISTRY

6. **Qualitative and Quantitative Analysis.** Repeated in second term, credit five hours. Prerequisite course 1. Mr. LEMON, and Messrs. UHLRICH, GIBBONS, YOUNT, BOIES, and ———. Lectures, T Th, 12, Morse L. R. 1.

Laboratory sections: M W F, 2-5; T Th S, 8-11; T Th S, 9-12.

Qualitative work: the properties and reactions of the common elements and acids and their detection in various liquid and solid mixtures.

Quantitative work: the preparation and use of volumetric solutions and work in elementary gravimetric analysis.

7. **Qualitative Analysis.** Second term, credit six hours. Prerequisite course 1. Mr. LEMON, and Messrs. ULRICH and YOUNT. Lectures and recitations, T Th, 9, Morse L. R. 3.

Laboratory, M F, 11-1; T Th, 2-5.

The properties and reactions of the common elements, and of the inorganic and organic acids, also the analysis of thirty unknowns, either in solution or in the solid form. Particular emphasis is laid on the writing of equations expressing the reactions involved in the work.

Students in science are advised and those who are specializing in chemistry are required to take this course instead of course 6.

[9. **Advanced Qualitative Analysis.** Second term, credit three hours. Prerequisite courses, 7, 17, 30, 50, and 65. Laboratory sections at hours to be arranged.

Essentially a continuation of course 7. A study of the most approved methods for separating and detecting a large number of metals and acids not studied in course 7, including many of the rare elements. In certain cases a comparative study is made of different methods designed to accomplish a given separation. The qualitative analysis of a number of solutions, solid mixtures, and minerals will be required.

Designed for graduate students who intend to take Analytical Chemistry as a major or a minor subject, and for other advanced students.] Not given in 1911-12.

12. **Quantitative Analysis, Elementary Course.** First term, credit six hours. Prerequisite course 6, or preferably 7. Dr. LUNDELL and Messrs. MARSH and LOHR. Lectures, T Th, 9.

Laboratory sections: T W Th, 2-5.30; W Th, 2-5.30 and S, 9-12.30.

The preparation and standardization of various volumetric solutions and their use in analyzing a variety of substances; gravimetric methods.

Students in science are advised and those who are specializing in chemistry are required to take this course instead of the quantitative analysis of course 6.

14. **Quantitative Analysis, Advanced Course.** Repeated in second term, Credit one to four hours. Prerequisite course 6, or 7 and 12. Dr. LUNDELL, and Messrs. MARSH, LOHR and WALKER.

Laboratory sections: 1st term, M T W Th, 2-5.30; T S, 9-12.30; second term, M T W Th F, 2-5; T Th S, 9-12.30.

Gravimetric, volumetric, and electrolytic methods of analysis, and methods of combustion analysis; analysis of iron ores, iron and steel, slags, paints,

lubricants, coal and coke, cements and cement materials, alloys, ores of copper, lead, zinc, mercury, manganese, tin, etc.

Designed for students that are specializing in chemistry, and as an elective for mechanical and civil engineering students.

15. **Quantitative Analysis, Advanced Lectures.** Second term, credit two hours. Prerequisite course 6, or 7 and 12. Dr. LUNDELL. M F, 11, Morse, L. R. 3. Selected topics in advanced quantitative analysis. Designed for students that are specializing in chemistry.

16. **Electrochemical Analysis.** Repeated in second term, credit one to three hours. Prerequisite course 6, or 7 and 12. Dr. LUNDELL and Mr. MARSH.

Laboratory sections: First term, M T W Th, 2-5.30; T Th S, 9-12.30; second term, M T W Th F, 2-5; T Th S, 9-12.30.

A study of the most approved electrochemical methods for the separation and determination of silver, lead, copper, tin, nickel, cobalt, and zinc. Practice will be given in the analysis of alloys and ores.

17. **Spectroscopic Chemical Analysis and Colorimetry.** Second term, credit two hours. Prerequisite courses 6, or 7 and 12; Physics 1 and 6. Mr. ANDERSON, and Messrs. A. R. HITCH and LOWARY. Lectures, W, 11, Morse, L R. 3.

Laboratory practice, (three actual hours) at hours to be arranged.

The lectures are devoted to a description of the instruments used in the laboratory and to a detailed discussion of spectroscopic methods.

The laboratory instruction includes the following work: the observation and mapping of emission spectra of various elements in the Bunsen flame, the electric arc, and the electric spark; the qualitative analysis of mixtures and minerals by the use of the Krüss spectroscope and the direct vision spectroscope; the observation and mapping of absorption spectra; the examination and identification of rare earths and of organic dyes in solution by means of their absorption spectra; the calibration of spectroscopes; spectrum photography; and practice in the use of colorimeters, polariscopes, and refractometers of various types.

18. **Assaying.** First term, credit three hours. Prerequisite course 6, or 7 and 12, and if possible a course in mineralogy. Dr. LUNDELL and Mr. WALKER. Lecture, F, 10, Morse 2.

Laboratory sections: M W, 2-5; W F, 2-5; M F, 2-5.

Lectures on the theory and practice of the scorification and crucible assay, and on the metallurgy of copper, lead, zinc, silver, and gold. In the laboratory, practice is given in assay of zinc, lead, copper, gold, and silver ores, mattes and bullion.

Designed for students that are specializing in chemistry, and as an elective for students in mechanical and civil engineering.

19. **Qualitative and Quantitative Gas Analysis.** Lectures. First term, credit one hour. Prerequisite courses 6, or 7 and 12; Physics 1 and 6. Mr. ANDERSON. T, 9, Morse L. R. 3.

A detailed discussion of many representative types of apparatus employed by the gas analyst, and of the various methods of analysis involved in their use. Numerous simple problems are assigned which afford practice

in the calculation and interpretation of the results obtained in the analysis of gases.

20. Technical Gas Analysis. First term, credit two hours. Prerequisite courses 6, or 7 and 12; Physics 1 and 6. Open to those who are taking course 19. Mr. ANDERSON, and Messrs. A. R. HITCH and LOWARY. Laboratory practice at hours to be arranged.

The analysis of gas mixtures with the apparatus of Honigmann, Bunte, Orsat, Lunge, and Hempel; the complete analysis of flue gas, illuminating gas, generator gas, acetylene, and air; the determination of the heating power of gaseous, liquid, and solid fuels, and the analysis of various substances by gas analysis methods involving the use of the different types of gas evolution apparatus such as the nitrometers of Hempel, Lunge, and Bodländer. Within certain limits the work may be selected to suit the requirements of the individual student.

21. Gas Analysis. Advanced course. Repeated in second term, credit one to four hours. Prerequisite courses 1, 6 (or 7 and 12), 19, and 20; Physics 1, and 5 or 6. Professor BROWNE and Mr. ANDERSON. Laboratory practice at hours to be arranged, Morse.

Special topics in the field of either scientific or industrial gas chemistry. The course may be elected by seniors and graduate students in chemistry, and is open to seniors or graduates in mechanical engineering that are specializing in gas power work.

ORGANIC CHEMISTRY

30. Organic Chemistry. Throughout the year, credit six hours a term. Prerequisite course 6 or 7, and open to those who have completed or are taking course 12. Professor ORNDORFF, Mr. E. F. HITCH, and Messrs. ALLEN and FINK. Lectures and written reviews, M W F, 9, Morse L. R. 3.

Laboratory sections: M T, 1-5.30; F, 1-5.30, and S, 8-1. Morse 9.

The lectures and written reviews serve as an introduction to the general subject of the chemistry of the compounds of carbon. In the laboratory the student prepares a large number of typical compounds of carbon and familiarizes himself with their properties, reactions, and relations. The detection of inorganic elements in organic compounds and the recognition of various groups or radicals is included in the laboratory work.

31. Organic Chemistry. Throughout the year, credit three hours a term. Prerequisite course 6 or 7, and open to those who have completed or are taking course 12. Professor ORNDORFF and Mr. E. F. ALLEN. M W F, 9, Morse Lecture Room 3.

This course consists of the lectures and written reviews of course 30.

32. Elementary Organic Chemistry. First term, credit four hours. Prerequisite courses 6 or 7, and open to those who have completed or are taking 12. Mr. E. F. HITCH and Mr. ALLEN. Lectures, and oral and written reviews, M W F, 12, Morse Lecture Room 3. Laboratory, Th, 2-5, Morse 10.

33. Special Chapters in Organic Chemistry. Throughout the year, credit two hours a term. Prerequisite course 30. Professor ORNDORFF. T Th, 9, Morse Lecture Room 2.

Especial attention is given to certain important chapters of organic chemistry. Frequent references are made to the original literature, and an attempt is made to acquaint the student with the classical researches in organic chemistry.

34. **Advanced Organic Chemistry.** Laboratory practice. Throughout the year. Open to those who have had course 30 and are taking 33. Professor ORNDORFF and Mr. E. F. HITCH. Hours to be arranged. The laboratory is open daily, Morse 10.

The course in the preparation of organic compounds is here continued, the preparations, however, being more difficult and requiring more experience and skill on the part of the student. The original literature is consulted, and, before taking up original work in this field, the student is finally required to repeat some extended and important piece of work, and to compare his results with those published.

35. **The Coal Tar Dyestuffs.** First term, credit one hour. Open to those who have had course 30 and have had or are taking 33. Professor ORNDORFF. Th, 12, Morse Lecture Room 3.

The coal tar dyestuffs have become so important, both theoretically and practically, as to justify their consideration in a separate course of lectures. The methods of making the dyestuffs, their properties, constitution and relations to each other are discussed, the treatment being scientific rather than technical.

[36. **Stereochemistry.** Second term, credit one hour. Prerequisite course 30 or 31. Professor ORNDORFF. Th, 12, Morse Lecture Room 3.

The stereochemistry of the compounds of carbon and nitrogen. The necessity of considering the space relations of the atoms in certain classes of physical isomers is shown and the close agreement of the facts and theory is brought out.] Not given in 1911-12.

37. **Methods of Organic Analysis.** Throughout the year. Prerequisite course 30. Professor ORNDORFF and Mr. E. F. HITCH. Hours to be arranged. The laboratory is open daily, Morse 10.

Designed for students that desire practice in the qualitative and quantitative analysis of commercial organic products such as alcohols, ethers, organic acids, glycerin, formalin, acetates, coal tar distillates, petroleum products, soaps, acetanilid, etc.

INORGANIC CHEMISTRY

46. **Inorganic Chemistry.** Advanced course. Throughout the year, credit two hours a term. Prerequisite course 30, and open to those who have completed or are taking courses 50 and 51. Professor DENNIS. T Th, 11, Morse Lecture Room 3.

The chemical elements are discussed in the order in which they occur in the Periodic Arrangement of Mendeleëff, and special attention is paid to the group properties of the elements and to the relations of the groups to one another. The rare elements and the rare earths are treated in as great detail as are the more common elements.

47. Advanced Inorganic Chemistry. Laboratory practice. Throughout the year. Prerequisite course 30. Professors DENNIS and BROWNE and Mr. ANDERSON. Morse 68.

The preparation and purification of inorganic compounds and the extraction of the rarer elements from ores and minerals.

Course 47 is designed to accompany course 46, but either course may be taken separately.

[48. Selected Topics in Advanced Inorganic Chemistry. First term, credit one hour. Prerequisite course 30. Courses 50 and 51 should either precede or accompany 48. Professor BROWNE.

Experimental lectures, dealing chiefly in 1910-11 with the hydronitrogens and their derivatives.

Open only to seniors and graduate students in chemistry.] Not given in 1911-12.

[49. Chemistry of Gases. First term, credit one hour. Prerequisite course 6, or 7 and 12, and should be preceded or accompanied by 19 and 20. Professor BROWNE.

The preparation, properties, and reactions of a large number of gases are discussed, and in many cases are illustrated by experiments. The various generalizations concerning gases are considered, not only in the light of their scientific value, but also to some extent from the point of view of their application to the practical problems of the gas chemist and of the gas engineer. The course may be elected by juniors, seniors, and graduate students in chemistry, and is open to seniors in mechanical engineering who intend to specialize in gas power work.] Not given in 1911-12.

PHYSICAL CHEMISTRY

50. Introductory Physical Chemistry. Throughout the year, credit three hours a term. Prerequisite course 30 and Physics 1, 6, and 10. Dr. WHITE. M W F, 9, Morse Lecture Room 4.

A systematic presentation of modern chemical theory. Especial attention is paid to the theory of solution, reaction velocity, catalysis, chemical equilibrium, and to the application of the principles of physical chemistry to chemical practice.

51. Physical Chemistry Laboratory. Throughout the year, credit three hours a term. Open only to those who have taken or are taking course 50. Dr. WHITE and Mr. BRIGGS. Two laboratory periods a week. M T, 2-5; F, 2-5, S, 9-12. Morse 77.

With the data obtained in the laboratory as a basis, detailed reports covering each sub-division are written. The subject matter includes: the calibration of pipettes, burettes, and measuring flasks; molecular weight determination by vapor density, freezing point and boiling point methods; vapor pressure; viscosity; colloids; diffusion; absorption; thermochemistry; reaction velocity; catalysis; dissociation; solubility; formation, separation and identification of phases; study of photo-chemical effects.

52. Advanced Physical Chemistry. Lectures throughout the year, credit three hours a term. Prerequisite course 50. Professor BANCROFT. M W F, 10, Lecture Room 4.

An exposition of the law of mass action in its application to chemical equilibrium and reaction velocities.

53a. **Colloid Chemistry and Photochemistry.** Throughout the year, credit two hours a term. Lectures. Professor BANCROFT. T Th, 10, Morse Lecture Room 4.

The theories of colloid chemistry and their applications to physiology, medicine and the arts. Open to students specializing in chemistry, who have taken course 50; to others only by special permission.

[55. **Theoretical Electrochemistry.** Lectures. Throughout the year, credit three hours a term. Professor BANCROFT.

The historical development of the subject with special reference to the theory of the voltaic cell. For advanced students in chemistry or physics.] Not given in 1911-12.

56a. **Applied Electrochemistry.** Lectures. Throughout the year, credit two hours a term. Prerequisite courses 6 or 7 and 12. Professor BANCROFT and Messrs. BENNETT and MILLER. M W, 12, Morse Lecture Room 4.

The preparation of compounds in the electric furnace; electrolytic extraction and refining of metals; theory of plating; electrolytic manufacture of inorganic and organic compounds; theory and practice of storage cells. Students that take this course are advised to supplement the lectures by laboratory practice, course 56b or 56c; this is however not obligatory.

56b. **Applied Electrochemistry.** Throughout the year, credit two hours a term. Prerequisite courses 6, or 7 and 12. Laboratory practice. W, 2-5, Th, 8-10, F, 2-5, S, 8-10, Morse 79. Professor BANCROFT, and Messrs. BENNETT and MILLER.

Preparation of electrical standards and measurements of electrical constants; qualitative study of conditions affecting electrolytic reactions; determination of current and energy efficiencies in electrolytic and electro-thermal work; preparation and tests of storage batteries; electrolytic preparation of inorganic and organic compounds. For students that are specializing in chemistry.

57. **Advanced Laboratory Practice.** Either term or throughout the year. Credit one to six hours a term. Prerequisite courses determined in each case by the professor in charge. Professor BANCROFT, Dr. WHITE, and Messrs. BENNETT and MILLER. Hours and work to be arranged. Morse.

Students may elect work in mass law, reaction velocity, or efficiency measurements with special reference to course 52; in colloid chemistry, photochemistry or photography with special reference to course 53; in conductivity or electrometric determinations with special reference to course 55; in electrolytic or electric furnace products with special reference to course 56; in metallography; in the application of physical chemical methods to organic chemistry.

MICROCHEMISTRY AND MICROCHEMICAL ANALYSIS

65. **Microchemical Methods.** Either term, credit two hours. Prerequisite course 6, or 7 and 12. Professor CHAMOT and Dr. RATHJEN. Laboratory practice at hours to be arranged.

The use of the microscope and its accessories, and microchemical methods and apparatus as applied to chemical investigations.

66. **Microchemical Analysis.** Either term, credit three hours. Prerequisite course 65. Professor CHAMOT and Dr. RATHJEN. Laboratory practice at hours to be arranged, Morse.

Practice in the examination and analysis of inorganic substances containing the more common elements with reference to rapid qualitative methods and the analysis of minute amounts of materials.

67. **Microchemical Analysis.** Either term, credit two or more hours. Prerequisite course 66. Professor CHAMOT. Laboratory practice, Morse.

This course may be arranged so as to comprise the analysis of inorganic substances containing the rarer elements, or of organic compounds.

SANITARY CHEMISTRY

70. **Foods, Beverages, and Food Accessories.** Either term, credit two hours. Prerequisite course 6, or 7 and 12. Mr. REDFIELD, T Th, 12, Lecture Room 4.

The source, preparation for use, and the chemistry of foods, beverages, and food accessories; the individual and relative assimilability, digestibility, and nutritive value of food products; the relation of pure and adulterated foods to the public health; the adulteration, sterilization, and preservation of foods; dietary standards, and the methods for carrying on nutrition investigation.

71. **Food Analysis.** First term. Prerequisite course 6, or 7 and 12. Professor CHAMOT and Mr. REDFIELD.

The examination of foods by chemical and optical methods, with reference to adulteration, imitation, and alteration; the examination of foods for artificial coloring matters, preservatives, and poisonous substances; a study of milk, comestible fats and oils, cereal products and starchy foods, canned goods, jellies, etc. This course may be extended so as to include the analysis of alcoholic beverages.

72. **Microscopical Examination of Foods.** Either term, credit two hours. Prerequisite course 65. Professor CHAMOT and Dr. RATHJEN. Hours to be assigned.

The use of the microscope in the examination of foods and condiments for the purpose of detecting adulterations and admixtures.

75. **Potable Water.** Either term, credit two hours. Prerequisite course 6, or 7 and 12. Professor CHAMOT. M W, 12, Morse Lecture Room 2.

Sources of potable water; how polluted; agencies at work leading to the natural or self purification of streams, etc., and what they accomplish; the data necessary for a decision as to the fitness of a water for household use, and for use in steam generators; the interpretation of the results of water analysis, chemical, microscopical, and bacteriological. Modern methods of water purification.

76. **Water Analysis.** Either term, credit three hours. Prerequisite course 6, or 7 and 12. Professor CHAMOT and Mr. REDFIELD. Hours to be arranged, Morse.

The methods employed for the examination of waters with reference to their fitness for household purposes, steam boilers, etc.; the testing of filters and water purifying devices for efficiency.

[80. **Toxicology.** First term, credit two hours. Prerequisite course 30. Professor CHAMOT.]

A review of the present methods for the separation and identification of the common poisons, together with a brief review of the classification, cause of action, and method of elimination of poisonous substances.] Not given in 1911-12.

[81. **Toxicology.** First term, credit two hours. Prerequisite course 30, and open only to those who are taking 80. Professor CHAMOT.] Not given in 1911-12.

AGRICULTURAL CHEMISTRY

85. **Agricultural Chemistry.** Second term, credit four hours. Prerequisite course Chemistry 1. Professor CAVANAUGH and Messrs. HEDGES, CROSS, and RICE. Lectures T Th S, 11. One recitation a week M, 8 or 9; W, 8 or 9; F, 8 or 9. Morse Lecture Room 1.

A general course treating of the relation of chemistry to agriculture and dealing with the composition and chemical properties of plants, soils, fertilizers, feed-stuffs, insecticides, and fungicides.

85a. **Agricultural Chemistry, Laboratory Course.** Repeated in second term, credit two hours. Prerequisite courses 1, 6, 85. Professor CAVANAUGH and Messrs. HEDGES and RICE. T Th, 2-4.30, W F, 8-10.30, Morse, Quantitative Laboratory. Designed to accompany course 85.

86. **Agricultural Chemistry, Advanced Course.** First term, credit two hours. Prerequisite course 87 or 88, or may be taken at same time with 87 or 88. Professor CAVANAUGH. T Th 9, Morse Lecture Room 4.]

87. **Agricultural Analysis.** First term, credit three hours. Prerequisite courses 1, 6, 85a, 86, or may be taken with 86. Professor CAVANAUGH and Mr. CROSS. T Th, 2-5, S, 9-12, Morse 57. The methods of the A. O. A. C. are studied, in the analysis of fertilizers, soils, and insecticides.

88. **Agricultural Analysis.** Second term, credit three hours. Prerequisite courses 87, 89. Professor CAVANAUGH and Mr. CROSS. T Th, 2-5, S, 9-12, Morse. Methods of examining foods, feed-stuffs, and dairy products.

[89. **Dairy Chemistry.** First term, credit two hours. Prerequisite courses 85, 85a. Professor CAVANAUGH.] Not given in 1911-12.

90. **Advanced Agricultural Analysis.** Repeated in second term. Prerequisite courses 86 or 89, 87, 88. Professor CAVANAUGH. Credit and hours by appointment, Morse. Designed to meet the needs of those who are doing research in agricultural chemistry.

SEMINARY

95. **Seminary.** Throughout the year. Morse Lecture Room 3. One hour every other week throughout the year.

This is a general seminary in which graduate students with major subjects in chemistry, and seniors that are specializing in chemistry are expected to take part.

96. **Research for Undergraduate Students.** Throughout the year. Morse.

Seniors that are specializing in chemistry are expected to elect at least four hours a term in research under the direction of some member of the staff of instruction.

BOTANY

1. **General Comparative Morphology and Physiology of Plants.** First term and until March 25th, credit three hours first term; one hour second term. Professor ATKINSON, Dr. McALLISTER, and Messrs. STONE, HIGGINS, and LEARN. One lecture, M, 10, 11 or 12, and two laboratory periods a week as follows: Sec. 1, M, W, 2-4:30; sec. 2, T, 8-10, 2-5; sec. 3, Th, 8-10, 2-5; sec. 4, first term: F, 9-11, S, 9-12; second term: F, 9-12, S, 9-11. Sage College, Botanical Lecture Room.

A study of representative plants of various groups and of the fundamental principles of plant life, relationship, and evolution.

2. **Special Morphology, Taxonomy, and Ecology of the Higher Plants.** Second term beginning March 27, credit two hours. Prerequisite course 1. Professor ROWLEE, Dr. BROWN, and Messrs. STONE, HIGGINS, and LEARN. One lecture, M, 10, 11, or 12, and two laboratory periods a week as follows: Sec. 1, M W, 2-4:30; sec. 2, T, 8-10, 2-5; sec. 3, Th, 8-10, 2-5; sec. 4, Fri, 9-12, S, 9-11. Sage College, Botanical Lecture Room.

Studies of typical plants representing the more general groups of angiosperms; field excursions for the purpose of studying the local flora.

3. **Organography and Identification of the Higher Plants.** First term, credit three hours. Prerequisite courses 1 and 2. Professor ROWLEE and Dr. BROWN. Lectures S, 9; laboratory and field work, F afternoon and S morning. Sage College, Botanical Lecture Room.

Lectures, laboratory, and field work.

A study of the kinds of plants with special reference to the morphology, identification, habitat, and range of species. Extra field work will be substituted for some of the lectures.

5. **Geographical Botany.** Second term. Professor ROWLEE and Dr. BROWN. Lecture S, 9. Laboratory exercises and excursions F, 2-5 and S. Sage College, Botanical Lecture Room.

The distribution of plants over the surface of the earth. Practical field studies in plant distribution; the preparation of an herbarium representing the local flora. Photographs are used to illustrate the distribution of plants.

7. **Taxonomy and Phylogeny of Angiosperms.** Throughout the year, credit three hours a term. Professor ROWLEE. Lectures, Th, 9. Laboratory work, W afternoon and Th morning, Sage College, Botanical Lecture Room.

A study of the genetic relationships of the phanerogamous orders. Practical studies in the laboratory of economic groups, illustrating the principles of natural classification.

8a. **Plant Cytology.** First term, credit three hours. Prerequisite courses 1 and 2. Dr. BROWN. Lecture F, 9. Laboratory work, F afternoon and S morning, and by appointment, Sage College, Histological Laboratory.

Introduction to methods of investigation. Studies of the vegetable cell, its multiplication and contents. Practical application of modern methods in a study of nuclear and cell-division. Open to graduates.

8b. **Comparative Histology of Plants.** Second term, credit three hours. Prerequisite course 8a. Dr. BROWN. Lecture F, 9. Laboratory work, F afternoon and S morning, and by appointment, Sage College, Histology Laboratory. Open to graduates.

Structure and development of the tissues of higher plants.

9a. **Dendrology.** First term, credit three hours. Course 5 may advantageously precede. Dr. BROWN and Mr. PALMER. Lecture T, 9. Laboratory and field work M afternoon and T morning. Sage College, Histology Laboratory. Open to graduates.

A biological and taxonomic study of trees and shrubs including laboratory study and field observations upon native species.

9b. **Dendrology.** Second term, credit three hours. Courses 8b and 9a may advantageously precede this course. Dr. BROWN and Mr. PALMER. Lectures T, 10. Laboratory and field work, M afternoon and T morning. Sage College, Histology Laboratory. Open to graduates.

Study of the development of woody structures, structure and properties of different kinds of wood, identification of woods.

10. **Comparative Morphology and Embryology.** Throughout the year, credit three hours a term. Prerequisite courses 1 and 2. Dr. McALLISTER. Lectures, Th, 12. Laboratory work, M and W afternoons. Sage College, Botany Lecture Room and Laboratory. Open to graduates.

A study of representative groups that illustrate the line of evolution of green plants. The development and homologies of sporogenous, reproductive, and embryological organs, with discussions of the principal plant phylae; permanent microscopic sections representing series in the liverworts, mosses, ferns, gymnosperms, and angiosperms; bryophyta; the pteridophyta; the gymnosperms and angiosperms.

11. **Mycology.** Throughout the year, credit four hours a term. Prerequisite courses 1 and 2. Professor ATKINSON and Mr. FITZPATRICK. Lectures, T Th 11. Laboratory work, M W afternoons. Sage College, Botany Lecture Room and Laboratory. Open to graduates.

Intended as the basis for research in mycology and plant pathology. General classification, development, and plant pathology. Basidiomycetes, with especial attention to edible and poisonous mushrooms, and wood-destroying and parasitic species; the parasitic fungi; their history and development. Practice in the recognition of species, or research may in some cases be taken as a parallel course. See course 14a.

12. **Taxonomy of the Pteridophytes, Bryophytes and Algae** Throughout the year, credit three hours a term. Dr. McALLISTER. Lecture, F, 11. Laboratory work, F afternoon and S morning, Sage College, Botany Lecture Room and Laboratory. Open to graduates and to undergraduates that are engaged in research.

A study of typical genera, practice in taxonomy, and field work.

13. **Methods of Research in Morphology and Embryology.** Prerequisite course 10, except by special permission. Professor ATKINSON and Dr. McALLISTER. Hours by appointment, Sage College, Botany Lecture Room.

Original research in sporogeny or embryology and the morphology of the nucleus with reference to sporogenesis, spermatogenesis, oogenesis, and fertilization, or in experimental morphology. A thesis embodying the results of the work will be prepared.

14a. General Taxonomic Survey of the Fungi. First term or throughout the year, credit four or eight hours a term. Prerequisite course 11, except by special permission. Professor ATKINSON and Mr. FITZPATRICK. Hours by appointment, Sage College, Botanical Laboratory. Open to graduates.

14b. Research in Morphology of the Fungi. Throughout the year, credit four hours a term. Professor ATKINSON and Dr. McALLISTER. Hours by appointment.

Monograph of some genus or limited number of genera, or monographic study of development. A thesis combining the results of the investigation will be required. Reports weekly. Open to graduates.

14c. Methods of Research in Plant Pathology. Professor ATKINSON and Mr. FITZPATRICK. Open to graduates.

Methods of cultivation of the fungi to secure familiarity with manipulation in methods of separation, pure culture, and study of development; problems in plant pathology; conferences or lectures and discussions on the history and present condition of the subject.

16. Research in Taxonomy and Phylogeny of the Angiosperms. Prerequisite courses 7 and 8, except by special permission. Professor ROWLEE. Hours by appointment.

Four hours or more a week. A monograph of some group, including a comparative study of organs of taxonomic value and their development. Groups for investigation will be assigned preferably in the preceding spring. Among the groups that may be taken up are the glume bearing monocotyledons, the amentiferous dicotyledons, and the compositæ. Since different groups will be taken up in different years, students may pursue this course more than one year. Open to graduates.

17. Research in Comparative Histology and Cytology. Prerequisite courses 8a and 8b. Professor ROWLEE and Dr. BROWN.

Not less than four hours a week. May form the basis of a major or minor subject for an advanced degree. Special problems in the comparative histology of a series of organs, or the anatomy of an individual plant. Cytology: the biology and structure of starch, plastids, and other cell contents, also nuclear division and cell formation, with special reference to tissue development. Open to graduates.

18. Seminary in Embryology, Mycology, Physiology, etc. Credit one hour. Professor ATKINSON. W, 5.

Discussions of current literature and problems under investigation. Required of all graduates and open to undergraduates that are interested in research.

19. Seminary in Comparative Histology and Taxonomy of the Angiosperms. Credit one hour. Professor ROWLEE. Hours by appointment.

Reading and discussion of current literature and problems under investigation in courses 16 and 17, will form the basis for the seminary work. Required of all graduates and open to undergraduates that are engaged in research.

BIOLOGY

1. **General Biology.** Throughout the year, credit three hours a term. Assistant Professor NEEDHAM and assistants. Agricultural College Main 302. Lectures, T Th, 11. Eight sections: M T W Th, and F, 2-4.30; F and S, 8-10.30; S, 10.30-1.

An elementary course designed to acquaint the general student with the principles of biology, through selected practical studies of living things. The interdependence of organisms, the simpler organisms, organization and phylogeny, oogenesis and ontogeny, heredity and variation, natural selection and adaptation, segregation and mutation, the life cycle, metamorphosis and regeneration, and the responsive life of organisms.

This course and Entomology 22 and 23 may be taken to meet the requirement of biology for entrance to the Medical College.

ENTOMOLOGY AND INVERTEBRATE ZOOLOGY

[1. **Invertebrate Zoology.**] Not given in 1911-12. See course 1 in Vertebrate Zoology.

3. **General Entomology.** First term, credit two or three hours. Prerequisite, General Biology 1 or Zoology 1. Lectures W F, 9, Agricultural College, Main 392. Professor COMSTOCK. Practical Exercises Th, or F, 2-4.30. Agricultural College, Main 392, Professor COMSTOCK and Miss STRYKE.

Lectures on the characteristics of orders, suborders, and the more important families. and on the habits of representative species. The practical exercises include a study of the structure of insects and practice in their classification. The lectures only (credit two hours) are taken by those who have had courses 4 and 5.

4. **Elementary Morphology of Insects.** Repeated in second term, credit three hours. Assistant Professor RILEY and Mr. THOMPSON. Laboratory open daily except Saturday, 8-5, Agricultural College, Main 391.

An introductory laboratory course required of all students who plan to do advanced work in the Department of Entomology.

5. **Elementary Systematic Entomology.** Repeated in second term, credit two hours. Prerequisite course 4. Assistant Professor RILEY, and Mr. THOMPSON. Laboratory open daily except S, 8-5, Agricultural College, Main 391.

A study of the wing venation of insects and the identification of specimens belonging to the more important orders and families. With course 4, required of all students who plan to do advanced work in the Department of Entomology.

6. **Advanced Systematic Entomology.** Repeated in second term, credit three hours. Prerequisite course 5. Assistant Professor MACGILLIVRAY. Laboratory work by appointment, Agricultural College, Main 301.

A training course in the identification and interpretation of obscure characteristics used in the classification of insects.

7. **Histology of Insects.** Lectures, first term. Laboratory repeated in second term, credit three or more hours. Prerequisite courses 3, 4, 5, and 12. Assistant Professor RILEY. Agricultural College, Main 391. A laboratory course to accompany or follow the first term of course 12.

10. Classification of the Coccidae. Second term, credit five hours. Prerequisite courses 4 and 5. Assistant Professor MACGILLIVRAY. Laboratory work by appointment, Agricultural College, Main 301.

Designed to familiarize the student with the more injurious species of scale insects, the methods of preparing specimens for study, and the systematic arrangement of the species.

11. Morphology and Classification of the Arachnida. Throughout the year, credit three or more hours a term. Professor COMSTOCK and Miss STRYKE. Laboratory work by appointment, Agricultural College, Main 391.

Open only to graduates.

12. Morphology and Development of Insects. Throughout the year. Second term, credit two hours a term. Prerequisite courses 3, 4, and 5. Laboratory work to accompany or to follow this course is offered under course 7. Professor COMSTOCK and Assistant Professor RILEY. T Th, 10, Agricultural College, Main 392.

14. German Entomological Reading. Throughout the year, credit one hour a term. Assistant Professor RILEY. W, 7-9 p. m., Agricultural College, Main 391. Open only to advanced students in entomology or zoology.

17. Literature of Systematic Entomology. First term, credit two hours. Prerequisite course 5. Assistant Professor MACGILLIVRAY.

A systematic study of bibliographies, indexes, and general entomological literature; the preparation of catalogues of insects; the evolution of the rules of zoological nomenclature; and the methods of determining the priority of generic and specific names.

19. General Limnology. Second term, credit three hours. Open only to students who have taken or are taking General Biology 1 and Entomology 3. Assistant Professor NEEDHAM. Lecture W, 8, Agricultural College, Main 302. Laboratory work: Sec. 1, Th, 2-4:30, Agricultural College, Main 332, or Biological Field Station. Assistant Professor NEEDHAM and Mr. LLOYD. Sec. 2, by appointment.

An introduction to the study of the life of inland waters. Aquatic organisms in their qualitative, quantitative, seasonal, and ecological relations.

20. Research in Limnology. Throughout the year, credit three or more hours a term. Prerequisite course 19 or the equivalent. Assistant Professor NEEDHAM. Hours by appointment, Agricultural College, Main 302 and Biological Field Station. Laboratory and field work.

22. Animal Parasites and Parasitism. First term, credit two hours. Must be preceded or accompanied by Biology 1 or Zoology 1. Assistant Professor RILEY. Lecture T, 8, Agricultural College, Main 392. Practical exercises: Sec. 1, M, 2-4:30; sec. 2, T, 2-4:30.

A consideration of the origin and biological significance of parasitism, and of the structure, life history, and economic relations of representative animal parasites.

23. The Relations of Insects to Disease. Second term, credit two hours. Prerequisite course 3 or 22. Assistant Professor RILEY. Lecture T, 8, Agricultural College, Main 392. Practical exercises T, 2-4:30.

Causation and transmission of diseases by insects and other arthropods.

24. **The Classification of Immature Insects.** First term, credit two hours. Prerequisite course 5. Assistant Professor MACGILLIVRAY. Laboratory work by appointment, Agricultural College, Main 301

The taxonomy of nymphs, larvae, and pupae.

27. **Research in Morphology of Insects.** Throughout the year, credit three or more hours a term. Prerequisite courses 3, 4, and 5. Professor COMSTOCK and Assistant Professor RILEY. Laboratory open daily except S, 8-5; S, 8-1, Agricultural College, Main 391.

Special work arranged with reference to the needs and attainments of each student.

28. **Research in Systematic Entomology.** Throughout the year, credit three or more hours a term. Prerequisite courses 3, 4, 5, and 6. Professor COMSTOCK and Assistant Professor MACGILLIVRAY. Laboratory open daily except S, 8-5; S, 8-1, Agricultural College, Main 301.

Special work arranged with reference to the needs and attainments of each student.

Seminary. Throughout the year. M, 4.30-5.30, Agricultural College, Main 392.

The work of an entomological seminary is carried on by the Jugatae, an entomological club which meets for the discussion of current literature and of the results of investigations. Attendance at the meetings may be counted as laboratory work.

Economic Entomology. Second term, W F, 9. See Entomology in College of Agriculture, course 3.

Advanced Economic Entomology and Insectary Methods. Second term. By appointment. See Entomology in College of Agriculture, course 9.

Research in Economic Entomology. Throughout the year. By appointment. See Entomology in the College of Agriculture, course 29.

ZOOLOGY

1. **General Zoology.** Throughout the year, credit three hours a term. Assistant Professor REED and Dr. ALLEN. T Th, 10, McGraw 5. Laboratory, F, 2-4.30. A second laboratory period will be arranged if needed.

A general survey of the phyla of animals, the life processes and relationships of animals, the principles of zoology, and an introduction to morphology and development.

2. **Morphology of Invertebrates.** First term, credit three hours. Prerequisite course 1. Assistant Professor REED and ———. The laboratory will be open T Th, 2-5 and W, 8-5.

The structure and development of selected types of invertebrate animals with collateral reading and quizzes.

3. **Comparative Anatomy of Vertebrates.** Second term, credit three hours. Prerequisite course 1. Assistant Professor REED and ———. Laboratory will be open T Th, 2-5, and W, 8-5.

A study of the structure and development of selected types of vertebrates.

4. **Comparative Morphology and Evolution of Vertebrates.** Second term, credit four hours. Prerequisite course 3. Assistant Professor REED. Lectures, M W F, 12. Demonstration at hours to be arranged.

The several systems of organs are considered with reference to their structures, development, homologies, and evolution in time.

5. **Systematic Vertebrate Zoology and Ecology.** Throughout the year, credit three hours a term. Assistant Professor REED and Dr. ALLEN. Lecture M, 8. Laboratory: sec. 1, Th, 2-4.30, and S, 8-10.30; sec. 2, F, 2-4.30, and S, 10.30-1, McGraw 7.

Lectures on the principles of classification and nomenclature; characters and relationships of groups; the habits, life histories, principles of coloration, and economic value of the common species. Laboratory study of representative forms with special reference to the parts employed in classification, and with a view to practical identification. Field work is given during the fall and spring.

6. **Ichthyology.** First term, credit three hours. Prerequisite course 5. Dr. WRIGHT. T Th, 9, McGraw 5. Laboratory will be open T and Th, 2-5, and W, 8-5.

A fuller consideration of fishes with respect to the taxonomic value of organs of both living and extinct species, geographical distribution, genetic relationships, and origin and evolution of groups. Given in alternate years with course 8.

7. **Herpetology.** Second term, credit three hours. Prerequisite course 5. Dr. WRIGHT. T Th, 9, McGraw 5. Laboratory will be open T and Th, 2-5, and W, 8-5.

A consideration of the amphibia and reptilia similar to that outlined for fishes in course 6. Given in alternate years with course 9.

[8. **Ornithology.** First term, credit three hours. Prerequisite course 5. Dr. WRIGHT.

The scope and method of course 6 will be followed. Given in alternate years with course 6.] Not given in 1911-12.

[9. **Mammalogy.** Second term, credit three hours. Prerequisite course 5. Dr. WRIGHT.

A study of mammals following the method of course 6. Given in alternate years with course 7.] Not given in 1911-12.

10. **Mammalian Anatomy.** First term, credit four hours. Assistant Professor REED and ———. Recitations and laboratory hours to be arranged.

A full consideration of the anatomy of the cat compared with other mammalian forms below the primates. Designed for prospective medical students and others wishing to become familiar with mammalian structure.

[11. **The Phylogenetic History of the Human Body.** First term, credit two hours. Assistant Professor REED.

A general course considering the zoological significance of the various organs of the human body and the phylogeny of man. Some previous knowledge of Zoology will facilitate the work of this course.] Not given in 1911-12.

[12. **General Ecology.** Throughout the year, credit three hours a term. Prerequisite course 5. Dr. ALLEN.

A general study of animal activities, typical animal societies, and their environmental relations. Special attention will be given to the geographic

distribution of animals in relation to physiography, vegetation and climate and to recent investigations in this field. Practice will be given in the use of instruments and methods of field investigation. A knowledge of physiology and the allied sciences is desirable.] Not given in 1911-12.

13. **Advanced Work and Research.** Throughout the year. Assistant Professor REED and Drs. WRIGHT and ALLEN.

14. **Seminary.** Weekly throughout the year. Required of all advanced and graduate students.

PHYSIOLOGY AND BIOCHEMISTRY

3. **Elementary Human Physiology.** First term, credit three hours. Professor SIMPSON and assistants. T Th S, 12, Stimson Hall, Large Amphitheatre.

For students who expect to teach physiology in the secondary schools, and an introductory course for students of the biological sciences. A general review of the functions of the systems and organs of the human body, with introductory remarks on structure. The lectures will be fully illustrated by experiments, lantern slides, and diagrams, and periodical quizzes and examinations will be given.

6. **Laboratory Work in Physiology.** First term, credit two hours. Professor SIMPSON and Assistants. Five hours a week, hours and days to be arranged, Stimson Hall, Practical Physiology Laboratory.

A beginning course in practical physiology. May be taken separately or along with course 3. In the laboratory the student is made to carry out for himself experiments which demonstrate the fundamental facts of the science, and he is taught to draw conclusions from these facts. All the apparatus required is supplied by the department.

8. **Advanced and Research Work in Physiology.** Throughout the year. Professor SIMPSON, Assistant Professor DRESBACH, and assistants. Daily, Stimson Hall, Advanced Laboratory.

The physiological and biochemical laboratories in Stimson Hall are open daily from 9 to 5 for advanced work and research. Subjects for original investigation are suggested and direction and advice are freely given during the prosecution of the work. A weekly or fortnightly seminary is held at which results are discussed and criticized by members of the staff and other workers in the department.

14. **Elementary Biochemistry.** First term, credit three hours. Prerequisite Chemistry 32, or the equivalent. Assistant Professor HUNTER M W F, 12, Stimson Hall, Amphitheatre.

Designed to impart an elementary knowledge of the chemistry of the substances met with in living, especially animal, tissues, and of the chief facts of digestion, metabolism, and nutrition.

17. **Special Chapters in Biochemistry.** First term, credit one hour. Prerequisite course, 14, or Chemistry 31, or the equivalent of either. Assistant Professor HUNTER. One hour weekly, to be arranged. Stimson.

Advanced lecture course on some selected topic in biochemistry.

20. **Advanced and Research Work in Biochemistry.** Throughout the year. Assistant Professor HUNTER and Instructor ———. Daily, 8-6.

HISTOLOGY AND EMBRYOLOGY

1. **The Tissues; Histology and Histogenesis.** First term, credit four hours. No prerequisite, but previous work in biology (zoology and botany) or physiology recommended. Professor KINGSBURY and assistants. Lectures, W F, 11, Stimson; laboratory, M W, 2-4:30, Stimson.

For students of biology or those preparing for medicine. The cell and cellular origin of the body and the structure and development of its component tissues. Each student will prepare or receive a series of typical microscopic preparations.

2. **The Organs: Histology and Development.** Second term, credit four hours. Prerequisite course 1 or the equivalent. Professor KINGSBURY and assistants. Lectures M F, 11; laboratory M W, 2-4:30, Stimson.

A continuation of course 1. Courses 1 and 2 together give the fundamental facts of the microscopic structure and development of the body.

3. **Special Histology and Technique.** First term, credit two or more hours. Prerequisite courses 1 and 2, or the equivalent. Professor KINGSBURY and assistants. Laboratory at hours to be arranged, Stimson.

In this course a more detailed knowledge of histology and facility in technique are gained by practical work in one or more of the fields of histology. Designed for those who desire a good working knowledge of histological methods for use in biology and in medicine.

3a. **The Microscope and Microscopic Methods.** First term, credit one hour. Professor KINGSBURY and assistants. Laboratory work at hours to be arranged, Stimson.

Designed for those who desire a practical knowledge of the microscope and the accessory apparatus, their care and use, as a preparation for courses in bacteriology.

4. **Embryology of Vertebrates.** Second term, credit three hours. Prerequisite course 1 or the equivalent. One lecture, demonstration, or recitation (T, 8) and two laboratory periods a week (hours to be arranged). Dr. HILTON and assistants.

For students of biology or zoology, or those preparing for medicine. Preparation and study of embryological specimens from all the chief groups of vertebrates.

5. **The Nervous System and Organs of Special Sense: Histology and Development.** Second term, credit two hours. Prerequisite course 1 or the equivalent. Laboratory work with demonstrations and quizzes. Professor KINGSBURY and Dr. HILTON. M W, 10-1, Stimson.

Designed for those students who wish a more detailed consideration of the nervous system and organs of special sense than can be given in other courses offered by the department.

7. **Advanced Histology and Embryology.** Throughout the year, credit three or more hours a term. Prerequisite courses 1, 2, 3, or the equivalent. Laboratory work with conferences at hours to be arranged. Professor KINGSBURY and Dr. HILTON.

Designed for those who are preparing theses or for those who wish to undertake special investigations in histology and embryology.

8. **Seminary.** Throughout the year, credit one hour. Prerequisite courses, 1, 2; may be taken with course 3 or 7. Professor KINGSBURY. Hours to be arranged, Stimson.

For the discussion of current literature and the presentation of original work by the members of the department staff and those doing advanced work in the department.

GEOLOGY

1. **Elementary Geology.** Throughout the year, credit three hours a term. Professors TARR, GILL, RIES, and HARRIS, and Messrs. PERRINE, STORRER, and MCKAY. Lectures T Th, 9. McGraw, Geological Lecture Room; one laboratory period a week, sections afternoons daily except Saturday, also probably Friday and Saturday mornings.

Planned to give beginners a knowledge of the fundamental principles and facts of geology by means of lectures, maps, lantern-slides, specimens, and field study. Students who intend to specialize in geology should take this course not later than their sophomore year.

PHYSICAL GEOGRAPHY

2. **Elementary Physical Geography.** Throughout the year, credit three hours a term. Lectures, M W, 9, McGraw, Professor TARR; laboratory, M or T, 2-4:30, McGraw 20, Dr. VON ENGELN and Mr. FILMER.

A general study of the development of the main features of the earth and their influence on mankind. Lectures illustrated by maps, models, and lantern slides.

One laboratory period a week consisting of short field excursions to points near the University in fall and spring; and in winter, indoor laboratory work consisting of experiments to illustrate the development of the simpler land forms, and a study of the physiographic provinces of the United States. Excursions to Taughannock Falls and the Susquehanna Divide; and voluntary excursions to Watkins Glen and Niagara Falls.

[3. **Geography of North America.** Throughout the year, credit two hours a term. Prerequisite course 2, or the equivalent. Professor TARR.

Lectures, quizzes, and examinations. The physiographic features of North America and their influence upon the history and industrial development of the various sections. Illustrated by lantern slides, maps, and models.

Courses 3 and 4 are given in alternate years.] Not given in 1911-12.

4. **Geography of Europe.** Throughout the year, credit two hours a term. Prerequisite course 2, or the equivalent. Professor TARR and Dr. VON ENGELN. T Th, 10, McGraw Hall, Lecture Room.

The physiographic features of Europe and their influence upon the history and industrial development of the several nations. Lectures illustrated by lantern slides, maps, and models. A weekly quiz of a half hour for each student at a period to be arranged.

5a. **Physiography.** First term, credit three hours. Prerequisite course 2. Lectures M W, 11, McGraw, Professor TARR; laboratory, W, 2-4:30, McGraw, Professor TARR, Dr. VON ENGELN, and Mr. FILMER.

A study of the forms of the land and their origin. Field excursions during the laboratory period in the fall; and two longer excursions on Saturday.

5b. **Glaciers and Glaciation.** Second term, credit three hours. Prerequisite course 2. Lectures, M W, 11, McGraw, Professor TARR; laboratory, M, 2-4.30, McGraw, Professor TARR, Dr. VON ENGELN, and Mr. FILMER.

A study of living glaciers and the phenomena of the glacial period. Field excursions during the laboratory period in the spring; and two longer excursions on Saturday.

6. **Meteorology and Climatology.** Second term, credit three hours. Professor WILSON. M W F, 10, Agricultural College.

Lectures, laboratory work, and weather observations. The general circulation of the atmosphere, development and movement of cyclones, tornadoes, and special storms, and conditions that attend them; practical weather maps and local observations; the use of meteorological instruments; general and special climatology, and its relation to agriculture.

8. **Experimental Physiography.** Throughout the year. Professor TARR, Dr. VON ENGELN, and Mr. FILMER. Hours to be arranged, McGraw.

Experiments by the individual students upon the origin and development of land forms. Amount of credit depends on nature and amount of work; in no case to be less than two hours throughout the year, or three hours for a single term.

9. **Seminary.** Throughout the year, credit two hours a term. Professor TARR. M, 4.30, McGraw, Physical Geography Laboratory.

Preparation and reading of reports upon special subjects, particularly upon investigations in the field. Abstracts and discussions of the current physiographic literature.

Open to undergraduates by special permission.

10. **Physiographic Research.** Throughout the year. Professor TARR.

Field and laboratory work with reading, conferences, excursions, and the presentation of reports. Original investigation, usually based upon field work, is undertaken by each student.

MINERALOGY AND PETROGRAPHY

11. **Elementary Mineralogy.** Second term, credit three hours. Professor GILL and Mr. GALPIN. Lectures, M W, 8. McGraw Geological Lecture Room. Laboratory sections to be arranged.

For beginners who desire a general knowledge of the commoner minerals and their uses, the properties by which they are recognized and their significance as constituents of the earth's crust, or as sources of useful substances.

Open to freshmen without special permission of the department.

12. **Crystallography.** First term, credit three hours. Prerequisite courses Chemistry 1 and 7, Physics 1. Lectures T Th, 8, McGraw Geological Lecture room; laboratory at hours to be arranged. Professor GILL and Mr. GALPIN.

The object of this course is to furnish a fundamental knowledge of the characteristics of crystallized matter as a basis for further study of crystalline substances in mineralogy, chemistry, or physics.

13. **Mineralogy.** Second term, credit three hours. Prerequisite course 12. Lectures T Th, 8, McGraw Geological Lecture Room; laboratory at hours to be arranged. Professor GILL and Mr. GALPIN.

For students wishing to become acquainted with the commoner minerals and the scientific and practical problems which they suggest.

14. **Blowpipe Determination of Minerals.** First term, credit one hour. Prerequisite course 11 or 13. Professor GILL and Mr. GALPIN. One laboratory period Saturday morning, McGraw, Mineralogical Laboratory.

15. **Crystal Measurement and Drawing.** Second term, credit two hours. Prerequisite course 12. Professor GILL. Days to be arranged, McGraw, Mineralogical Laboratory.

Course 15 should be taken by students in course 11 who intend to continue in either course 14 or course 17. Laboratory measurements of crystals, with computation and drawing.

16. **Physical Crystallography.** First term, credit three hours. Prerequisite course 12. Professor GILL. M W, and laboratory to be arranged. McGraw, Mineralogical Laboratory.

Especial attention is devoted to the optical properties of crystals.

17. **Petrography.** Second term, credit three hours. Prerequisite courses 12, 13, 16. Professor GILL. M W, and laboratory to be arranged. McGraw, Mineralogical Laboratory.

Designed to give an elementary knowledge of the determination of minerals and rocks under the microscope.

18. **Seminary in Mineralogy and Crystallography.** Throughout the year, credit one hour a term. Prerequisite courses 12, 13, 16. Professor GILL. Hours to be arranged, McGraw.

Devoted to the study either of current literature, or of some of the more important classics on the subject.

19. **Advanced or Special Work in Mineralogy and Petrography.** Throughout the year. Prerequisite courses dependent on nature of work. Professor GILL. Hours to be arranged, McGraw.

Adapted to the needs of the individual student.

PALEONTOLOGY AND STRATIGRAPHIC GEOLOGY

22. **Stratigraphic Geology.** Throughout the year, credit three hours a term. Prerequisite course 1. Professor HARRIS. Lectures, M W F, 11, McGraw 23. Laboratory and field work at hours to be arranged.

First term: Paleozoic of the world. Excursions to Little Falls, Syracuse, Rochester and Wilkes-Barre. Second term: Mesozoic and Cenezoic of the world.

For teachers and students of earth sciences generally.

23. **Paleontology** (Protozoa-Molluscoidea). Second term, credit two hours. Prerequisite course 1, and General Biology 1, or the equivalent. Professor HARRIS. M W, 9, McGraw 23.

First term: Protozoa-molluscoidea.

Second term: Mollusca-vertebrata.

For general biological and geological students. Intended to supplement ordinary biologic courses, also to give geologic students a foundation for future paleontologic work. Treatment biological.

24. Paleontology and Stratigraphic Geology and Research. Course 1 and Biology 1 or the equivalent must be taken before or with this course. Professor HARRIS and Miss SHELDON. Hours to be arranged, McGraw 23.

Advanced stratigraphic and paleontologic research, progress of research and current literature. The more advanced research deals with the tertiary formations.

29. Geological Evolutions of Organisms. Throughout the year, Prerequisite, the elements of physics and geology (course 1), and zoology, invertebrate desired. Hours to be arranged. Professor WILLIAMS.

For the purpose of training students to understand the problems and to practice the science of paleontology.

ECONOMIC GEOLOGY

30. Building Stones and Clay Products. Second term, credit three hours. Professor RIES and Messrs. MACKENZIE and DEWEY. Lectures M, W, 9. Laboratory either M or W, 10, McGraw.

The occurrence, distribution, and uses of building stones, and the applications of clay for structural products. Only by special permission may the lectures be taken without the laboratory work.

31. Practical Geology. Throughout the year, credit three hours a term. Registration by special permission. Professor RIES and Messrs. MACKENZIE, KRAMM, and STARKWEATHER. Lectures, M W, 11; laboratory work, M T W Th F, 2 or S, 8, McGraw.

The practical application of geologic principles and the occurrence of such economic materials as are of importance to engineering students, the whole subject being treated with reference to their needs.

32. General Economic Geology. Throughout the year, three hours a term. Prerequisites course 1. Professor RIES and Mr. MACKENZIE. Lecture M W, 10; laboratory T, 2, F, 9, or Th, 2, McGraw.

The origin, nature, distribution, and uses of the non-metallic, and metallic products of the earth's crust. First term, the non-metallics, including coal, oil, gas, clays, salt, fertilizers, etc. Second term, the metallic products, including the ores of iron, copper, lead, zinc, gold, silver, etc. Students may take lectures without laboratory only by special permission. A portion of the laboratory work may be replaced by field trips.

33. Field Examination of Mineral Deposits. First term, credit two hours. Prerequisite course 31 or 32. Professor RIES. Hours to be arranged, McGraw.

Designed to acquaint the student with the methods used for examining deposits of economic value, with a view to determining their extent and character.

34. Mining of Mineral Deposits. Two hours a term. Mr. KRAMM. Lectures, time to be arranged. McGraw.

A general course describing the methods of mining deposits of economically valuable materials, and the relation between the origin and structure of the deposits and the methods used.

35. Clay Investigation. Prerequisite Geology 1 or 31, and Chemistry 1 or its equivalent. Professor RIES and Mr. MACKENZIE. Hours to be arranged, McGraw.

Lecture, laboratory work, field work, and reading. Designed to familiarize the student with the character, occurrence, and applications of clays.

36. **Advanced Economic Geology.** Throughout the year. Prerequisite course 32. Professor RIES. Hours to be arranged, McGraw.

Laboratory, field work, and reading. The course varies with the needs of the individual student.

Primarily for graduates.

37. **Economic Geology Seminary.** Throughout the year. Professor RIES. T, 4.30, McGraw.

Abstracts and discussions of current literature, and preparation of papers on special subjects.

38. **Seminary in Foreign Literature.** Throughout the year, credit two hours a term. Prerequisite course 32. Professor RIES. Hours to be arranged, McGraw.

Reading and discussion of some of the more important foreign works on economic geology.

For graduates only.

39. **Experimental Economic Geology.** Prerequisite courses 32 and Chemistry 1, or the equivalent. Professor RIES and Mr. MACKENZIE. Hours to be arranged, McGraw.

Laboratory experiments demonstrating some of the general principles of ore deposition.

40. **Bibliography of Economic Geology.** First term, credit two hours. Prerequisite course 32. Mr. MACKENZIE. Hours to be arranged, McGraw.

Lectures and discussions on the more important literature of economic geology.

Primarily for graduates.

SEMINARY

51. **General Department Seminary in Geology.** Once each month at hours to be arranged. Registration for the course is to be filed with the Chairman of the Department.

MILITARY SCIENCE AND TACTICS

1. **Infantry Training and Instruction.** Throughout the year. ——— and assistants. M W F, 4.45, Armory.

Practical and theoretical instruction, alternating according to the needs of the student.

A comprehensive course designed to equip the college man with such military instruction and training as will enable him to become an efficient company officer of volunteer infantry in time of war. Includes infantry drill; school of the soldier, company, battalion, and regiment; ceremonies; guard duty; position and aiming drills, gallery and target practice; minor tactics, advance and rear guard, outposts, and reconnoissance; camping and marching; first aid and sanitation; military bridges, roads, obstacles, and field entrenchments; military papers and company administration.

Required of all men in the four year courses. May be elected in lieu of physical training by men in the three year courses.

2. **Elective Drill.** Throughout the year, credit two hours a term. Pre-requisite course 1. ——— and assistants. M W F, 4.45, Armory.

An advanced course covering all phases of the practical work of the infantryman. May be elected by second year men of the four year courses in lieu of the required physical training.

3. **Military Science.** Second term, credit two hours. T Th, 12, Goldwin Smith.

Lectures and collateral reading. A purely theoretical course designed to give the student who is seeking a general liberal education such a knowledge of military science as will enable him intelligently to comprehend the military branch of government, military history, military affairs in general, and their relation to the state and society. Of especial value to the student whose tastes are somewhat military, and who intends to keep up his military interests in connection with the National Guard or otherwise.

4. **Band Music.** Practical and theoretical instruction. Throughout the year, credit two hours a term. Mr. BRISSETTE. M W F, 4.45, Armory.

All instruments, music, uniforms, etc., are furnished by the University free of cost to the student. The members constitute the University Band.

Open to all students who have made a satisfactory beginning with any of the customary band instruments. Properly qualified students may substitute this course for either the required military drill (course 1), or the required physical training.

PHYSICAL CULTURE

1. **Physical Exercises.** Throughout the year. Professor YOUNG and assistants. Three days a week.

For those freshmen who, in the judgment of the Director, are physically unfitted for required military drill, and for all those who are allowed to substitute, for military drill, work in this department. Class and squad work; exercises prescribed for individual deformity and immaturity.

2. **Physical Exercises.** Throughout the year. Professor YOUNG and assistants. Three days a week.

For sophomores who elect work in the department as part of the required work in physical training. Class and squad work; special exercises or work prescribed in one of the various branches of athletics under the general supervision of the department.

3. **Physical Exercises.** Throughout the year. Professor YOUNG and assistants. Three days a week.

Elective for juniors and seniors. Class and squad work, or prescribed exercises.

4. **Boxing, Wrestling, and Fencing.** Throughout the year. Messrs. CONLEY, O'CONNELL, and GELAS. Daily except S, Gymnasium.

May be counted toward the required work of freshman and sophomore years, and toward work for which credit is given in the junior and senior years. A special fee of \$5.00 a term is charged for instruction in each branch.

5. **Swimming.** Throughout the year. Mr. READ. Daily except S, 3, Gymnasium.

Required of all students who are unable to swim sixty feet. No student who is unable to satisfy this requirement will, unless excused because of physical disability, receive credit for work in the department.

10 **Physical Training for Women.** Throughout the year. Miss CANFIELD. Sage College.

Required of freshmen and sophomores.

11. **Advanced Gymnastics.** Throughout the year, credit two hours. Prerequisite course 10 or the equivalent. Miss CANFIELD. M T W Th F, 5.30, Sage College Gymnasium.

CALENDAR

First Term, 1911-12

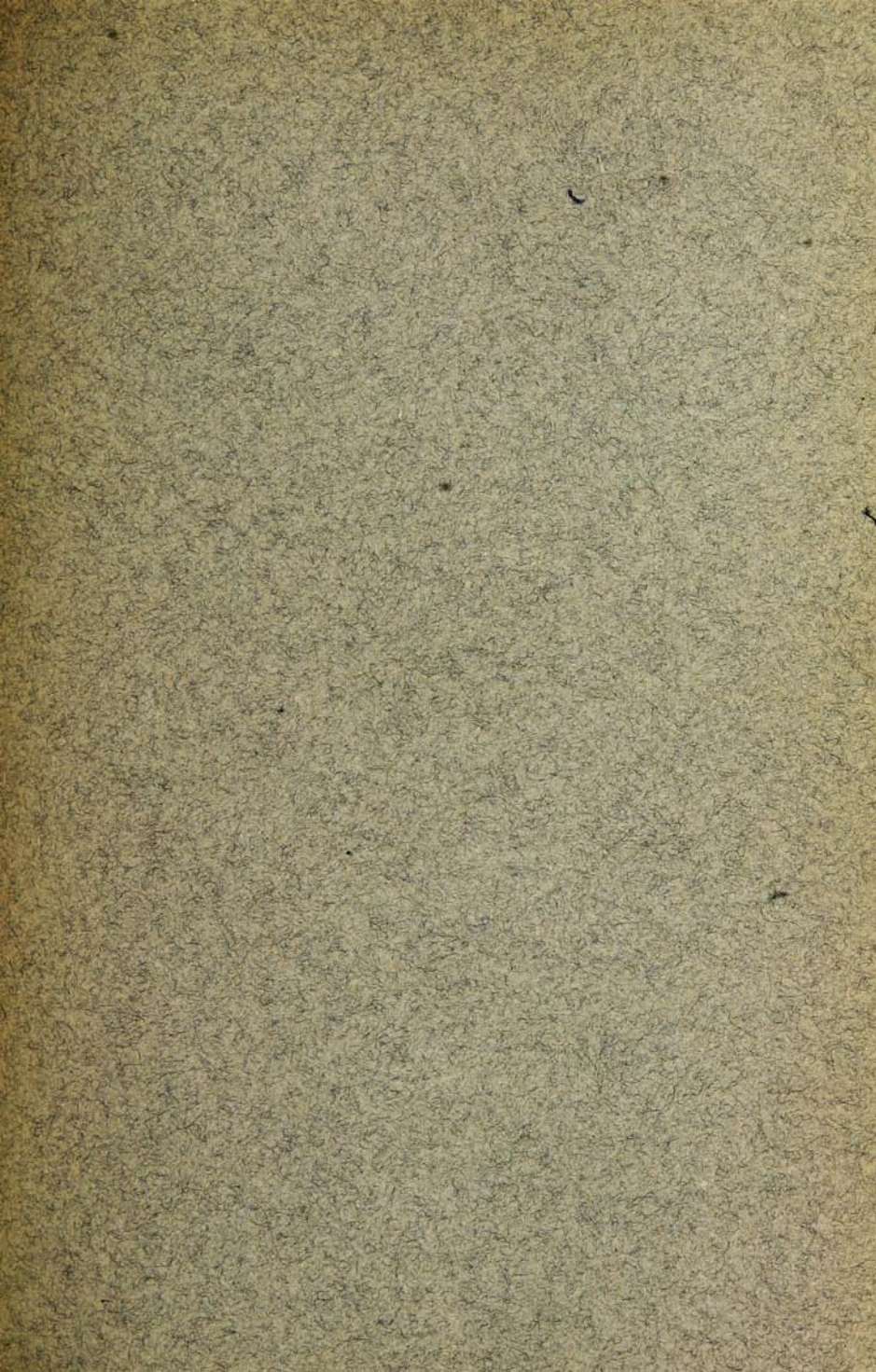
Sept. 15,	Friday,	University entrance examinations begin.
Sept. 25,	Monday,	Academic year begins. Registration of new students. Scholarship examinations begin.
Sept. 26,	Tuesday,	Registration of new students. Registration in the Medical College in N. Y. City.
Sept. 27,	Wednesday,	Registration of old students.
Sept. 28,	Thursday,	Instruction begins in all departments of the University at Ithaca. President's annual address to the students at 12.00 m.
Sept. 30,	Saturday,	Registration, Graduate School.
Oct. 17,	Tuesday,	Last day for payment of tuition.
Nov.	Thursday-Friday,	Thanksgiving recess.
Nov. 28,	Tuesday,	Winter Courses in Agriculture begin.
Dec. 1,	Friday,	Latest date for announcing subjects of theses for advanced degrees.
Dec. 20,	Wednesday,	Instruction ends
Jan. 3,	Wednesday,	Instruction resumed } Christmas Recess.
Jan. 10,	Wednesday,	The '94 Memorial Prize Competition.
Jan. 11,	Thursday,	Founder's Day.
Jan. 29,	Monday,	Term examinations begin.

Second Term, 1911-12

Feb. 10,	Saturday,	Registration, undergraduates.
Feb. 12,	Monday,	Registration, Graduate School.
Feb. 12,	Monday,	Instruction begins.
Feb. 23,	Friday,	Winter Courses in Agriculture end.
Mar. 1,	Friday,	Last day for payment of tuition.
April 3,	Wednesday,	Instruction ends.
April 9,	Tuesday,	Instruction resumed. } Spring Recess.
April 9,	Tuesday,	The latest date for presenting Woodford Orations.
April 15,	Monday,	The latest date for receiving applications for Fellowships and Scholarships in the Graduate School.
May 3,	Friday,	The Woodford Prize Competition.
May 17,	Friday,	The '86 Memorial Prize Competition.
June 1,	Saturday,	Navy Day.
June 3,	Monday,	Term examinations begin.
June 12,	Wednesday,	Commencement of the Medical College in New York City.
June 20,	Thursday,	Forty-third Annual Commencement.

Summer Session, 1912

July 8,	Monday,	Summer Session begins.
Aug. 16,	Friday,	Summer Session ends.



OFFICIAL PUBLICATIONS OF CORNELL UNIVERSITY

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These publications include the Catalogue Number (containing lists of officers and students), and the Book of Views, for each of which a charge of twenty-five cents a copy is made, and the following informational publications, any one of which will be sent gratis and post-free on request. The date of the last edition of each publication is given after the title.

General Circular of Information for prospective students, August 1, 1911.

Announcement of the College of Arts and Sciences, January 15, 1911.

Courses of Instruction in the College of Arts and Sciences, June 15, 1911.

Announcement of Sibley College of Mechanical Engineering and the Mechanic Arts, Feb. 1, 1911.

Announcement of the College of Civil Engineering, June 1, 1911.

Announcement of the College of Law, May 15, 1911.

Announcement of the College of Architecture, September 1, 1911.

Announcement of the Medical College.

Announcement of the New York State College of Agriculture, October 1, 1911.

Announcement of the Winter Courses in the College of Agriculture, September, 1910.

Announcement of the Summer School in Agriculture, July 1, 1911.

Announcement of the New York State Veterinary College, May 1, 1911.

Announcement of the Graduate School, March 15, 1911.

Announcement of the Summer Session, April 1, 1911.

Annual Reports of the President and the Treasurer, November, 1910.

Pamphlets on scholarships, fellowships, and prizes, samples of entrance and scholarship examination papers, special departmental announcements, etc.

Correspondence concerning the publications of the University should be addressed to

The Registrar of Cornell University,
Ithaca, N. Y.